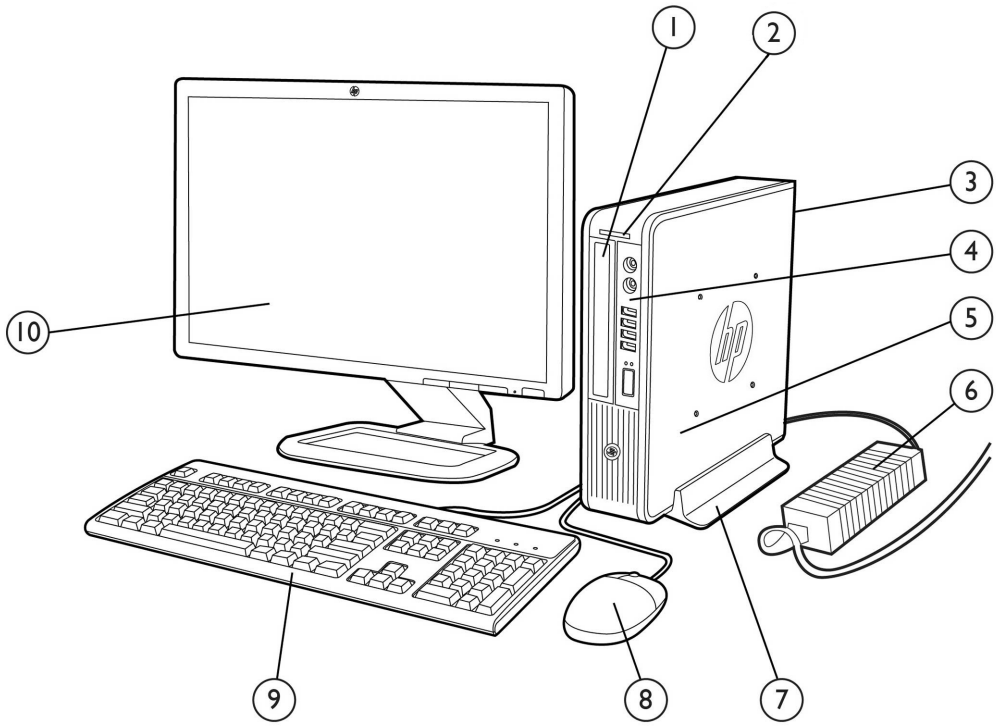
HP Compaq 8200 Elite Ultra Slim Desktop Business PC



1 Optical Disc Drive

2 Secure Digital (SD) Card Reader (optional)

3 Rear I/O includes (6) USB 2.0 ports, DisplayPort v1.1a and VGA video interfaces, PS/2 mouse and keyboard ports, RJ-45 network interface, 3.5mm audio in/out jacks

4 Front I/O includes (4) USB 2.0 ports, dedicated headphone output, and a microphone/headphone jack

5 2.5” internal hard disk drive bay

6 135W 87% efficient external Power Adapter or
180W 87% efficient external Power Adapter (when configured with discrete graphics)

7 HP USDT Tower Stand (optional)

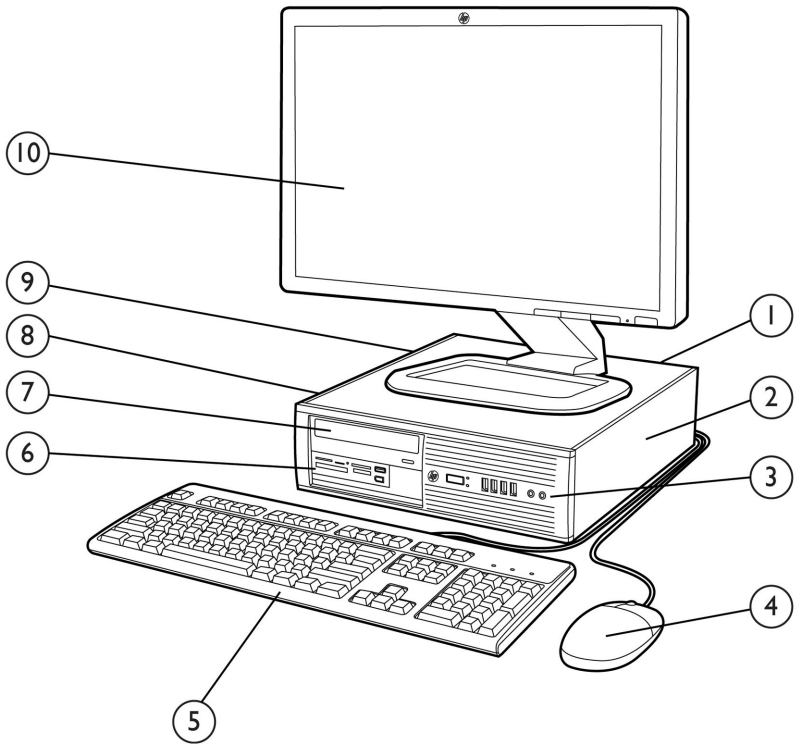
8 HP Mouse

9 HP Keyboard

10 HP Monitor (sold separately)

Overview

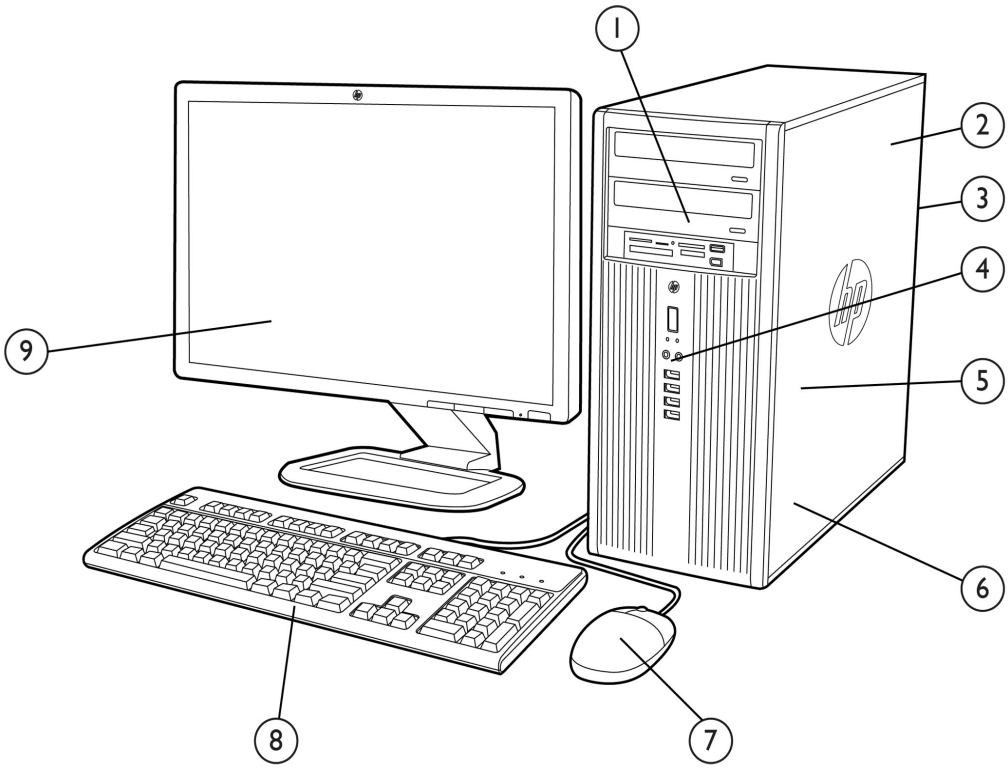
HP Compaq 8200 Elite Small Form Factor Business PC



1	Rear I/O includes (6) USB 2.0 ports, serial port, PS/2 mouse and keyboard ports, RJ-45 network interface, DisplayPort v1.1a and VGA video interfaces, and 3.5mm audio in/out jacks
2	Low profile expansion slots include (1) PCI, (1) PCI Express x1 and (2) PCI Express x16 graphics
3	Front I/O includes (4) USB 2.0 ports, dedicated headphone output, and a microphone/headphone jack
4	HP Mouse
5	HP Keyboard
6	3.5” external drive bay supporting a media card reader or a secondary hard disk drive
7	5.25” external drive bay supporting an optical disk drive
8	3.5” internal drive bay supporting primary hard disk drive
9	240W standard or 90% high efficiency Power Supply
10	HP Monitor (sold separately)

Overview

HP Compaq 8200 Elite Convertible Minitower Business PC



1 (3) 5.25” external drive bays supporting optical disk drives, removable hard disk drives, or the HP Media Card Reader

2 320W standard or 90% high efficiency Power Supply

3 Rear I/O includes (6) USB 2.0 ports, serial port, PS/2 mouse and keyboard ports, RJ-45 network interface, DisplayPort v1.1a and VGA video interfaces, and 3.5mm audio in/out jacks

4 Front I/O includes (4) USB 2.0 ports, dedicated headphone output, and a microphone/headphone jack

5 (3) 3.5” internal drive bays supporting multiple hard disk drives capable of RAID configurations

6 Full height expansion slots include (3) full-length PCI, (1) PCI Express x1, and (2) full-length PCI Express x16 graphics

7 HP Mouse

8 HP Keyboard

9 HP Monitor (sold separately)

Overview

At A Glance

- Choice of four professional chassis form factors: USDT, SFF, CMT
- PC chassis and all internal components and modules are 100% free of brominated flame retardants (BFRs) and Polyvinyl Chloride (PVC).
- UEFI BIOS developed and engineered by HP for better security, manageability and software image stability
- Intel Q67 Express chipset supporting Intel 2nd generation Core processors, featuring Intel HD Graphics and vPro Technology (available with select processors)
- Intel 82579LM GbE integrated network connection
- DDR3 Synchronous Dynamic Random Access Memory (SDRAM)
- Integrated dual independent monitor support via VGA and digital DisplayPort v1.1a video interfaces
- Discrete graphics options available for all platforms including the Ultra Slim Desktop (USDT)
- SRS Premium Sound audio management software
- Standard efficiency or 90% high efficiency energy saving power supplies available on the SFF and CMT models
- 87% efficient energy saving external power adapter standard with USDT models
- ENERGY STAR qualified
- SFF and CMT models can be configured with multiple hard disk drives in a RAID array
- Guaranteed lengthy purchase lifecycles and image stability
- Software image fully compatible across all models and form factors
- Created using industry leading Design for Environment standards
- Selected configurations with global availability easily set up and ordered through HP.com Business to Business portals (http://h10019.www1.hp.com/business-site/index.html)
- Tailored HP Factory Express deployment and lifecycle services available (http://h71028.www7.hp.com/enterprise/cache/97688-0-0-225-121.aspx)
- Protected by HP Services, including standard warranties up to 5-5-5 (terms and conditions vary by country; certain restrictions and exclusions apply)
- Tool-less serviceability features for easier upgrades and repairs

Standard Features and Configurable Components (availability may vary by country)

Operating Systems

Preinstalled	Genuine Windows 7 Home Basic Edition (32-bit)
	Genuine Windows 7 Home Premium Edition (32-bit or 64-bit)
	Genuine Windows 7 Professional Edition (32-bit or 64-bit)
	Genuine Windows 7 Ultimate Edition (32-bit or 64-bit)
	FreeLnx
Supported	Genuine Windows XP Professional Edition
	Genuine Windows Vista Home Basic1
	Genuine Windows Vista Business1
	Genuine Windows Vista Enterprise Edition1
	Genuine Windows 7 Enterprise Edition
Certified	Novell SUSE Linux Enterprise Desktop 11†
	Red Hat Enterprise Linux 64††

1 Certain Windows Vista product features require advanced or additional hardware. Refer to the following web sites for details:
www.microsoft.com/windowsvista/getready/hardwarereqs.mspx
www.microsoft.com/windowsvista/getready/capable.mspx

Windows Vista Upgrade Advisor can help you determine which features of Windows Vista will run on your computer. To download the tool, visit: www.windowsvista.com/upgradeadvisor

† The following features are not supported by Novell SUSE Linux Enterprise Desktop:

- Intel Gigabit CT Desktop NIC
- Broadcom NetXtreme Gigabit Ethernet Plus
- HP 22-in-1 Media Card Reader
- HP ProtectTools
- HP Blu-ray Writer playback of commercial movies
- DisplayPort video interface
- HP 2nd serial port adapter
- Power Management features
- Systems configured with Linux do not qualify for ENERGY STAR

†† The following features are not supported by Red Hat Enterprise Linux 64:

- TPM v1.2 embedded Security Chip
- Intel Gigabit CT Desktop NIC
- HP Wireless 802.11b/g/n NIC
- HP 22-in-1 Media Card Reader
- HP Blu-ray Writer
- HP FireWire / IEEE 1394 PCI Card
- HP 2nd serial port Adapter
- HP USB Smart Card (CCID) Keyboard
- AMD Radeon HD 6350 Graphics

Standard Features and Configurable Components (availability may vary by country)

- NVIDIA Quadro NVS 295 Graphics
- Power Management features
- Systems configured with Linux do not qualify for ENERGY STAR

Value Added Software (included with all models; not included when configured with FreeDOS)

HP ProtectTools Security Suite
HP Software Management Agent
Computrace for Desktops agent
HP Vision Diagnostics
PDF Complete Special Edition (trialware)
Microsoft Office Starter Edition 2010

Value Added Software (included with select models; not included when configured with FreeDOS)

HP Power Assistant v2.0
Computer Setup Utility
Roxio Creator Business
Norton Internet Security 2011 [1]
Norton Internet Security 2012 [1]
HP Connect
HP MyRoom
HP Virtual Rooms
Corel WinDVD
HP Direct Connect
Box Online Storage – Unlimited
Microsoft Windows Virtual PC – XP Mode
Box Online Storage – Unlimited (United States of America only)

[1] Includes a 60 day subscription for virus definition and minor program revision updates. Internet access required to receive updates.

HP Client Management Solutions (available for free download from the Internet)

http://www.hp.com/go/easydeploy

HP Client Automation Starter[1]
HP SoftPaq Download Manager
HP Client Catalog for Microsoft SMS
HP Systems Software Manager

[1] Available from your HP Sales Representative or HP Channel Partner

HP Business PC Services and Features

HP Stable Platform Program
Intel Stable Image Platform Program (SIPP)
Business-to-Business Portals
HP Global Series Services
Factory Express Deployment and Lifecycle Services
Intel Core vPro Processors
Trusted Platform Module (TPM) v1.2[1]

[1] TPM module disabled where use is restricted by law.

Service and Support

On-site warranty and service[1]: This limited warranty and service offering delivers parts, labor and on-site repair for terms up to 5 years. Response time is next business day[2] and includes free telephone support[3] 24 x 7. Global coverage[2] ensures any product purchased in one country and transferred to another non-restricted country will remain fully covered under the original warranty and service offering. Some countries/regions do not offer one year onsite and labor.

Standard Features and Configurable Components (availability may vary by country)

[1] Terms and conditions may vary by country. Certain restrictions and exclusions apply
[2] On-site services may be provided pursuant to a service contract between HP and an authorized HP third party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country
[3] Technical telephone support applies only to HP configured, HP and HP qualified third party hardware and software. Toll-free calling and 24 x 7 support may not be available in some countries.

Chipset

Intel Q67 Express

Processor

	USDT	SFF/CMT
Intel® Pentium® Processors		
Intel Pentium G620 Processor 2.60 GHz, 3M cache, 2 cores/2 threads Intel HD Graphics	X	X
Intel Pentium G630 Processor 2.70 GHz, 3M cache, 2 cores/2 threads Intel HD Graphics	X	X
Intel Pentium G840 Processor 2.80 GHz, 3M cache, 2 cores/2 threads Intel HD Graphics	X	X
Intel Pentium G850 Processor 2.90 GHz, 3M cache, 2 cores/2 threads Intel HD Graphics	X	X
Intel Pentium G860 Processor 3.00 GHz, 3M cache, 2 cores/2 threads Intel HD Graphics	X	X
Intel® 2nd Generation Core™ i3 Processors		
Intel Core i3-2100 Processor 3.10 GHz, 3M cache, 2 cores/4 threads Intel HD Graphics 2000	X	X
Intel Core i3-2105 Processor 3.10 GHz, 3M cache, 2 cores/4 threads Intel HD Graphics 3000	X	X
Intel Core i3-2120 Processor 3.30 GHz, 3M cache, 2 cores/4 threads Intel HD Graphics 2000	X	X
Intel Core i3-2130 Processor 3.40 GHz, 3M cache, 2 cores/4 threads Intel HD Graphics 2000	X	X
Intel® 2nd Generation Core™ i5 Processors		

Standard Features and Configurable Components (availability may vary by country)

Intel Core i5-2400 Processor 3.10 GHz, 6M cache, 4 cores/4 threads Intel HD Graphics 2000 Intel Stable Image Platform Program (SIPP) Supports Intel vPro Technology		X
Intel Core i5-2400S Processor 2.50 GHz, 6M cache, 4 cores/4 threads Intel HD Graphics 2000 Intel Stable Image Platform Program (SIPP) Supports Intel vPro Technology	X	
Intel Core i5-2500 Processor 3.30 GHz, 6M cache, 4 cores/4 threads Intel HD Graphics 2000 Intel Stable Image Platform Program (SIPP) Supports Intel vPro Technology		X
Intel Core i5-2500S Processor 2.70 GHz, 6M cache, 4 cores/4 threads Intel HD Graphics 2000 Intel Stable Image Platform Program (SIPP) Supports Intel vPro Technology	X	
Intel® 2nd Generation Core™ i7 Processors		
Intel Core i7-2600 Processor 3.40 GHz, 8M cache, 4 cores/8 threads Intel HD Graphics 2000 Intel Stable Image Platform Program (SIPP) Supports Intel vPro Technology		X
Intel Core i7-2600S Processor 2.80 GHz, 8M cache, 4 cores/8 threads Intel HD Graphics 2000 Intel Stable Image Platform Program (SIPP) Supports Intel vPro Technology	X	

Intel 2nd Generation Core vPro Processors

All HP Compaq 8200 Elite Series models featuring this technology include processors that are part of the Intel 2011 Stable Image Platform Program (SIPP) designed to ensure the stability promise inherent in the value proposition of the HP Compaq 8200 Elite Series Business PC, thus making these models the most stable, secure, and manageable platforms available to enterprises today.

Intel Active Management Technology (AMT) v7.0 – An advanced set of remote management features and functionality which provides network administrators the latest and most effective tools to remotely discover, heal, and protect networked client systems regardless of the system's health or power state. AMT 7.0 includes the following advanced management functions:

- Power Management (on, off, reset)
- Hardware Inventory (includes BIOS and firmware revisions
- Hardware Alerting
- Agent Presence
- System Defense Filters
- SOL/IDER
- Cisco NAC/SDN Support

Standard Features and Configurable Components (availability may vary by country)

- ME Wake-on-LAN
- DASH 1.1 compliance
- IPv6 Support
- Fast Call for Help – a client inside or outside the firewall may initiate a call for help via BIOS screen, periodic connections, or alert triggered connection
- Remote Scheduled Maintenance – pre-schedule when the PC connects to the IT or service provider console for maintenance. Remote PCs can get required patches, be inventoried, etc by connecting to their IT console or Service Provider when it's convenient
- Remote Alerts – automatically alert IT or service provider if issues arise
- Access Monitor – Provides oversight into Intel® AMT actions to support security requirements
- PC Alarm Clock
- Microsoft NAP Support
- Host Base set-up and configuration
- Management Engine (ME) firmware roll back
- Wireless AMT functionality on Desktop (WoDT)
- Enhanced KVM resolution

Redundant Array of Independent Drives (RAID)

Flexible implementation:

- DriveLock is supported while in RAID mode. Users can manage the DriveLock password from within F10 Setup. Locked drives will be displayed as such in the RAID option ROM interface.
- Hard drive information can be viewed within F10 Setup while in RAID mode. Previously, the hard drives will not appear in Drive Configuration when switching to RAID mode.
- DPS Self Test can be executed on physical hard drives while in RAID mode.
- The RAID Setup Utility (accessed through CTRL-I) can be protected by the F10 Setup password.

NOTE:
RAID 1 is the only RAID configuration offered via factory configurations. The pre-configured systems:

- Are only available on the SFF and CMT form factors. The USDT does not support RAID as it does not allow for more than one hard disk drive.
- Are complete RAID systems and have both drives installed. If the CMT is configured with three hard disk drives, the third drive is would be unpartitioned and not part of the RAID array
- Have the necessary Option ROM configuration.
- Are pre-loaded and pre-installed with all required Intel software.
- Include a preinstalled operating system that is mirrored mode out of the box.

Please refer to the HP White Paper titled “Advanced Host Controller Interface (AHCI) and Redundant Array of Independent Disks (RAID) on HP Compaq 8200 Elite Series PCs” at: http://www.hp.com for more information and instructions.

System Memory Support

The HP Compaq 8200 Elite Series supports the 2nd generation Intel® Core™ processor family. Based on a new PC micro-architecture, the processor is designed for a two-chip platform consisting of a processor and Platform Controller Hub (PCH). Unlike previous generations, the processor includes an integrated memory controller (IMC). The IMC supports DDR3 protocols with two independent, 64-bit wide channels each accessing one or two DIMMs.

- Two channels of non-ECC unbuffered DDR3 memory with a maximum of two UDIMMs or SODIMMs per channel

Standard Features and Configurable Components (availability may vary by country)

- Single-channel and dual-channel memory organization modes
- Data burst length of eight for all memory organization modes
- DDR3 memory data transfer rates of 1066 MT/s (PC3-8500) and 1333 MT/s (PC3-10600)
- 64-bit wide channels
- DDR3 I/O voltage of 1.5V
- Maximum memory bandwidth of 10.6 GB/s in single-channel mode or 21 GB/s in dual-channel mode assuming DDR3 1333 MT/s (PC3-10600)
- 1GB, 2GB, and 4GB DDR3 DRAM technologies are supported. Using 4 GB device technologies, the largest memory capacity possible is 32 GB, assuming dual channel mode with four x 8 GB dual ranked unbuffered DIMM memory configuration.

CAUTION: You must shut down the computer and disconnect the power cord before adding or removing memory modules. Regardless of the power-on state, voltage is always supplied to the memory modules as long as the computer is plugged in to an active AC outlet. Adding or removing memory modules while voltage is present may cause irreparable damage to the memory modules or system board.

Memory Configurations: Ultra Slim Desktop

Slot 1 is black and must always be populated. Not all memory configurations possible are represented below.

NOTE:
For systems configured with more than 3 GB of memory and a 32-bit operating system, all memory may not be available due to system resource requirements. Addressing memory above 4 GB requires a 64-bit operating system

Total Memory	Socket	
	Channel A (black)	Channel B (black)
2 GB (dual channel)	1 GB	1 GB
4 GB (dual channel)	2 GB	2 GB
8 GB (dual channel)	4 GB	4 GB

Memory Configurations: **Small Form Factor**
Convertible Minitower

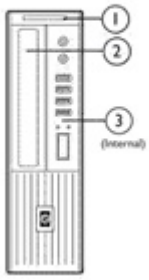
Slot 1 is black and must always be populated. Not all memory configurations possible are represented below.

NOTE:
For systems configured with more than 3 GB of memory and a 32-bit operating system, all memory may not be available due to system resource requirements. Addressing memory above 4 GB requires a 64-bit operating system.

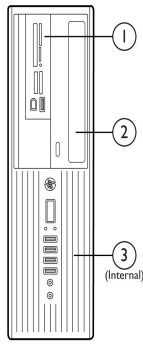
Standard Features and Configurable Components (availability may vary by country)

Total Memory	Socket			
	Channel A		Channel B	
	1 (black)	2 (white)	3 (white)	4 (white)
2 GB	2 GB	unpopulated	unpopulated	unpopulated
4 GB (dual channel)	2 GB	unpopulated	2 GB	unpopulated
8 GB (dual channel)	2 GB	2 GB	2 GB	2 GB
16 GB (dual channel)	4 GB	4 GB	4 GB	4 GB

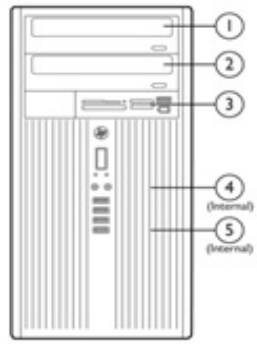
USDT



SFF



CMT



Storage Drive Support									
	USDT			SFF			CMT		
	SDR	ODD	HDD	MCR	ODD	HDD	MCR	ODD	HDD
Quantity Supported	1	1	1	1	1	2	1	2	3
Position	1	2	3	1	2	1,3	3	1,2	4,5,6

Data Storage Drives

	USDT	SFF/CMT
160-GB Hard Disk Drives		
HP 160GB 7.2K rpm SATA 3.0Gb/s 2.5" Hard Disk Drive	X	
HP 160GB 10K rpm SATA 3.0Gb/s 2.5" Hard Disk Drive Includes 3.5" adapter		X
250-GB Hard Disk Drives		
HP 250-GB 7.2K rpm SATA 3.0Gb/s 2.5" Hard Disk Drive	X	
HP 250-GB 7.2K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive		X
300-GB Hard Disk Drive		

Standard Features and Configurable Components (availability may vary by country)

HP 300GB 10K rpm SATA 3.0Gb/s 2.5” Hard Disk Drive Includes 3.5” adapter		X

320-GB Hard Disk Drive

HP 320-GB 7.2K rpm SATA 3.0Gb/s 2.5” Hard Disk Drive	X	
HP 320-GB 7.2K rpm SATA 3.0Gb/s 2.5” Self-Encrypting Drive Includes 3.5” adapter when installed in SFF or CMT	X	X

500-GB Hard Disk Drives

HP 500-GB 7.2K rpm SATA 6.0Gb/s 3.5” Hard Disk Drive		X

750-GB Hard Disk Drives

HP 750-GB 7.2K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive		X

1-TB Hard Disk Drives

HP 1-TB 7.2K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive		X

Solid State Drives

HP 80-GB SATA 3.0Gb/s Solid State Drive Includes 3.5” adapter when installed in SFF or CMT	X	X
HP 120-GB SATA 3.0Gb/s Solid State Drive Includes 3.5” adapter when installed in SFF or CMT	X	X
HP 128-GB SATA 3.0Gb/s Solid State Drive Includes 3.5” adapter when installed in SFF or CMT	X	X
HP 160-GB SATA 3.0Gb/s Solid State Drive Includes 3.5” adapter when installed in SFF or CMT	X	X

NOTE: Use of HP System Software Recovery Disks (SSRD) is not supported on 80GB or 128GB SSD models due to minimum image size requirements (>=140GB) for the SSRD.

Optical Disc Drives

HP DVD-ROM Drive[1]		X
HP Slim DVD-ROM Drive[1]	X	
HP SuperMulti DVD Writer Drive[1,2,3]		X
HP Slim SuperMulti DVD Writer Drive[1,2,3]	X	
HP Blu-ray Writer Drive		X
HP Slim Blu-ray Writer Drive	X	

[1] For playing DVDs, Corel WinDVD 8
[2] For writing CDs, choice of Sonic/Roxio Easy Media Creator 9 or Roxio Business Creator 10
[3] For writing CDs and DVDs, video editing and authoring DVDs, choice of Sonic/Roxio Easy Media Creator 9 or Roxio Business Creator 10

Standard Features and Configurable Components (availability may vary by country)

Media Card Readers		
HP 22-n-1 Media Card Reader		X
HP Secure Digital (SD) HC Media Reader	X	

Security Solutions and Capabilities

	USDT	SFF/CMT
Trusted Platform Module (TPM) 1.2[1]	X	X
SATA port disablement (via BIOS)	X	X
Drive lock	X	X
RAID configurations		X
HP ProtectTools Security Software Suite	X	X
Intel Identify Protection Technology (IPT): Models configured with Intel 2nd generation Core processors have the ability to utilize advanced security protection for online transactions. IPT, used in conjunction with participating web sites, provides double identity authentication by adding a hardware component in addition to the usual user name and password. IPT is initialized through an HP ProtectTools module		
Serial, parallel, USB enable/disable (via BIOS)	X	X
Optional USB Port Disable at factory (user configurable via BIOS)	X	X
Removable media write/boot control	X	X
Power-On password (via BIOS)	X	X
Setup password (via BIOS)	X	X
HP Solenoid Hood Lock / Sensor		X
HP Hood Sensor	X	
Support for chassis padlocks and cable lock devices	X	X

[1] TPM module disabled where use is restricted by law.

Network Interface Connections

	USDT	SFF/CMT
Intel 82579LM integrated GbE Network Connection	X	X
Intel Gigabit CT Desktop NIC (PCIe x1)		X
HP 802.11 b/g/n Wireless NIC (PCIe x1)		X
Intel Centrino Advanced-N 6205 Wireless NIC (mini PCI Express)	X	

NOTE: Either the integrated network connection or the Intel Centrino wireless NIC is required to support Intel vPro Technology features.

Standard Features and Configurable Components (availability may vary by country)

Graphics

	USDT	SFF/CMT
Intel HD Graphics 2000/3000 (integrated)	X	X
ATI Radeon HD 5450 Graphics (MXM)	X	
AMD FirePro 2270 Graphics (PCIe x16)		X
AMD Radeon HD 6350 Graphics (PCIe x16)		X
AMD Radeon HD 6450 Graphics (PCIe x16)		X
AMD Radeon HD 6570 Graphics (PCIe x16) Only available as a single graphics card configuration		CMT only
Nvidia NVS 295 Graphics (PCIe x16)		X
Nvidia NVS 300 Graphics (PCIe x16)		X
Nvidia NVS 310 Graphics (PCIe x16)		X
Nvidia GeForce 405 Graphics (PCIe x16) Available in China only		X
HP DisplayPort Cable	X	X
HP DisplayPort to DVI-D Adapter	X	X
HP DisplayPort to HDMI Adapter	X	X
HP DisplayPort to VGA Adapter	X	X
Surround View (enable/disable via F10)*	X	X

* For Windows 7 systems, this enables the Surround View option that allows the integrated graphics controller and an AMD PCI Express graphics card to work at the same time for multi-monitor support.

Multi-Media

	USDT	SFF/CMT
High Definition Audio with Realtek ALC261 codec (all ports are stereo)	X	X
Microphone/Headphone* and dedicated headphone front ports (3.5mm)	X	X
Line-out and Line-In rear Ports* (3.5mm)	X	X
Multi-streaming capable*	X	X
Internal Speaker (standard)	X	X
HP Thin USB Powered Speakers	X	X
HP TV Tuner (mini PCIe card)	X	
HP USB HD 720P Business Webcam	X	X
HP Business Headset	X	X
SRS Premium Sound	X	X

*The front microphone port is re-taskable as a Line-in, Microphone-in or Headphone-in port. Rear audio input ports are re-taskable as a Line-in or Microphone-in port. External speakers must be powered externally. Multi-streaming can be enabled in the Realtek control panel to allow independent audio streams to be sent to/from the front and rear jacks. This allows for different audio applications to use separate audio ports on the system. For example, the front jacks could be used with a headset for a communications application while the rear jacks are being used with external speakers and a multimedia application.

Standard Features and Configurable Components (availability may vary by country)

Input/Output Devices	USDT	SFF/CMT
HP PS/2 Standard Keyboard	X	X
HP USB Standard Keyboard	X	X
HP USB Keyboard with USB ports	X	X
HP USB Smart Card (CCID) Keyboard	X	X
HP USB Mini Keyboard	X	X
HP USB and PS/2 Washable Keyboard	X	X
HP PS/2 Optical Mouse	X	X
HP USB Optical Mouse	X	X
HP USB Laser Mouse	X	X
HP USB and PS/2 Washable Mouse	X	X

Miscellaneous Devices and Configurations	USDT	SFF/CMT
HP FireWire IEEE 1394 Card		X
HP SuperSpeed USB 3.0 PCIe x1 Card		X
HP Serial Port Adapter (RS-232 compatible); provides 2nd Serial Port		X
HP Parallel Port Adapter		X
HP eSATA Port Adapter		X
HP USDT Tower Stand	X	
HP SFF Tower Stand		SFF only
Configure CMT in desktop orientation		CMT only
HP USDT Rear Port/Cable Control Cover	X	

After-Market Options (availability may vary by region)

Communication Devices	USDT	SFF/CMT	Part Number
Intel Gigabit CT Desktop NIC (PCIe x1)		X	FH969AA
Broadcom NetXtreme GbE Ethernet Plus NIC (PCIe x1)		X	FS215AA
HP Wireless 802.11 b/g/n NIC (PCIe x1)		X	FH971AA

NOTE: The use of any of these optional NIC Cards (wired or wireless) will disable the Intel vPro Technology features.

Graphics Solutions	USDT	SFF/CMT	Part Number
AMD Radeon HD 6350 Graphics (PCIe x16)		X	QK638AA
AMD Radeon HD 6450 Graphics (PCIe x16)		X	QM229AA
AMD Radeon HD 6570 Graphics (PCIe x16)		CMT/MT only	QP027AA
Nvidia NVS 295 Graphics (PCIe x16)		X	FY943AA
Nvidia NVS 300 Graphics (PCIe x16)		X	BV456AA
Nvidia GeForce 405 Graphics (PCIe x16) (Available in China only)		X	QM194AA
HP DisplayPort Cable Kit	X	X	VN567AA
HP DisplayPort To Dual Link DVI-D Adapter	X	X	NR078AA
HP DisplayPort To DVI-D Adapter	X	X	FH973AA
HP DisplayPort to HDMI Adapter	X	X	BP937AA
HP DisplayPort to VGA Adapter	X	X	AS615AA
HP DMS-59 to Dual DVI Cable		X	DL139A
HP DMS-59 to Dual DisplayPort Adapter		X	XP688AA

Data Storage Drives and Accessories	USDT	SFF/CMT	Part Number
HP 160GB SATA 10K SFF in 3.5in Frame Hard Disk Drive	X	X	EW222AA
HP 300GB SATA 10K SFF in 3.5in Frame Hard Disk Drive	X	X	FM802AA
HP 500-GB 7.2K rpm SATA 6.0Gb/s 3.5” Hard Disk Drive		X	QK554AA
HP 750-GB 7.2K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive		X	QR469AA
HP 1-TB 7.2K rpm SATA 6.0Gb/s 3.5” Hard Disk Drive		X	QK555AA
HP 128-GB SATA 3.0Gb/s Solid State Drive	X	X	QV063AA
HP 160-GB SATA 3.0Gb/s Solid State Drive	X	X	QV064AA
HP 180-GB SATA 3.0Gb/s Solid State Drive	X	X	C1N42AA

NOTE: Use of HP System Software Recovery Disks (SSRD) is not supported on 128GB SSD models due to minimum image size requirements (>=140GB) for the SSRD.

HP eSATA Adapter		X	FH966AA

After-Market Options (availability may vary by region)

HP Removable SATA Hard Drive Enclosure (frame & carrier)		X	RY102AA
HP Removable SATA Hard Drive Enclosure (carrier only)		X	RY103AA

Input Devices

	USDT	SFF/CMT	Part Number
HP PS/2 Standard Keyboard	X	X	DT527A
HP USB Standard Keyboard	X	X	DT528A
HP USB Keyboard with USB ports	X	X	BT330AA
HP USB Mini Keyboard	X	X	AS601AA
HP USB Gray Keyboard	X	X	DT529A
HP USB Smart Card (CCID) Keyboard	X	X	BV813AA
HP USB Keyboard and Mouse Kit	X	X	RC465AA
HP USB Washable Keyboard	X	X	VF097AA
HP USB and PS/2 Washable Mouse	X	X	BM866AA
HP USB and PS/2 Washable Keyboard and Mouse Kit	X	X	BU207AA
HP PS/2 Optical Mouse	X	X	EY703AA
HP USB Optical Mouse	X	X	DC172AT
HP USB Laser Mouse	X	X	GW405AT
HP USB Travel Mouse	X	X	RH304AA
HP 2.4GHz Wireless Keyboard and Mouse	X	X	NB896AA

System Memory

	USDT	SFF/CMT	Part Number
HP 1 GB DIMM		X	AT023AA
HP 2 GB DIMM		X	AT024AA
HP 4 GB DIMM		X	VH638AA
HP 1 GB SO-DIMM	X		VH639AA
HP 2 GB SO-DIMM	X		VH640AT
HP 4 GB SO-DIMM	X		VH641AT

After-Market Options (availability may vary by region)

Multimedia Devices	USDT	SFF/CMT	Part Number
HP Thin USB Powered Speakers	X	X	KK912AA
HP DVD-ROM Drive		X	AR629AA
HP SuperMulti DVD Writer Drive		X	AR630AA
HP Blu-ray Writer Drive		X	AR482AA
HP Slim DVD-ROM Drive	X		VP033AA
HP Slim SuperMulti DVD Writer Drive	X		VP034AA
HP USB HD 720P Business Webcam	X	X	QP896AA
HP Business Headset	X	X	QK550AA

Removable Media Storage	USDT	SFF/CMT	Part Number
HP USB External Diskette Drive	X	X	DC141B
HP 22-n-1 Media Card Reader		X	AR941AA

Security Devices	USDT	SFF/CMT	Part Number
HP/Kensington MicroSaver Cable Lock	X	X	PC766A
HP Business PC Security Lock	X	X	PV606AA
HP USDT Rear Port Controller Cover	X		VN571AA
HP SFF Solenoid Lock and Hood Sensor		SFF only	BP428AA
HP CMT Solenoid Lock and Hood Sensor		CMT only	DE618A
HP SFF Wall Mount/Security Sleeve		SFF only	VN570AA
HP Keyed Lock Cable	X	X	BV411AA

HP Client Automation Software	USDT	SFF/CMT	Part Number
HP Client Automation – Standard Edition (single seat)	X	X	T3488AA
HP Client Automation – Standard Edition (10 seats)	X	X	TA599AA
HP Client Automation – Standard Edition (100 seats)	X	X	TA600AA
HP Client Automation – Standard Edition (500 seats)	X	X	TA601AA
HP Client Automation – Standard Edition (1,000 seats)	X	X	T3489AA

After-Market Options (availability may vary by region)

Stands and Accessories	USDT	SFF/CMT	Part Number
HP Integrated Work Center Stand (USDT)	X		LH526AA
HP Integrated Work Center Stand (SFF)		SFF only	QP897AA
HP USDT Tower Stand	X		VN568AA
HP SFF Tower Stand		SFF only	VN569AA
HP Serial Port Adapter (RS-232 compatible)		X	PA716A
HP 5.25” Blank Bezel Kit (50 pack)		X	DC177B
HP FireWire IEEE 1394 Card		X	PA997A
HP SuperSpeed USB 3.0 Card		X	BM867AA

Technical Specifications

Weights & Dimensions (configured with 1 HDD & 1 ODD)	USDT	SFF	CMT
Chassis (H x W x D)	2.6 x 9.9 x 10 in 66 x 252 x 254 mm	4.0 x 13.3 x 14.9 in 100 x 338 x 379 mm	17.6 x 7.00 x 18.0 in 448 x 178 x 445 mm
System Volume	257.5 cu in 4.2 L	782.77 cu in 12.8 L	2166.34 cu in 35.5 L
Tower Stand (H x W x D)	1.1 x 4.9 x 6.7 in 27 x 125 x 170 mm	1.1 x 7.0 x 7.9 in 29 x 178 x 200 mm	N/A
Packaging (H x W x D)	8.6 x 15.7 x 19.7 in 218 x 398 x 500 mm	9.0 x 19.7 x 23.4 in 229 x 500 x 594 mm	22.6 x 12.7 x 24.4 in 575 x 323 x 620 mm
System Weight*	6.8 lb 3.1 kg	16.7 lb 7.6 kg	24.5 lb 11.2 kg
Shipping Weight*	14.4 lb 6.5 kg	17.9 lb 8.1 kg	34.0 lb 15.4 kg
Max Supported Weight (desktop orientation)	77.0 lb 35.0 kg	77.0 lb 35.0 kg	77.0 lb 35.0 kg

I/O Ports	USDT	SFF/CMT
USB 2.0	Front – four (4) ports Rear – six (6) ports	
Serial	N/A	one RS-232 compatible port standard second port available optionally
Parallel	N/A	one port available as an option
eSATA	N/A	one port available as an option
PS/2	color coded support for keyboard (purple) and mouse (green)	
Video	VGA and DisplayPort v1.1a provide integrated dual independent monitor support	
DVI output	available via optional DisplayPort to DVI Adapter	
Audio	Front – microphone & headphone Rear – line input (supports microphone or line input), line out All ports are 3.5mm in diameter **NOTE:** See Audio/Visual section for information on re-taskable audio ports.	
NIC	Industry standard RJ-45 port accesses the integrated network interface controller	

Slots	USDT	SFF	CMT
Mini PCI Express	1 each	N/A	N/A
MXM	1 each	N/A	N/A

Technical Specifications

Conventional PCI Revision 2.3 5-volt	N/A	1 each 2.5” low profile 6.6” length 25W max. power	3 each 4.2” full height 6.6” length 25W max. power
PCI Express 2.0	N/A	1 each x1 slot 2.5” low profile 6.6” length 25W max. power	1 each x1 slot 4.2” full height 6.6” length 25W max. power
	N/A	1 each x16 slot 2.5” low profile 6.6” length 25W max. power	1 each x16 slot 4.2” full height 6.6” length 75W max. power (for single graphics card) 35W max. power (for dual graphics cards)
	N/A	1 each x16 slot (wired as a x4) 2.5” low profile 6.6” length 25W max. power	1 each x16 slot (wired as a x4) 4.2” full height 6.6” length 35W max. power

Bays	**USDT**	**SFF**	**CMT**
3.5” external	N/A	1 bay available for Media Card Reader unless used for a secondary hard drive	N/A
5.25” external	N/A	1 each 8.19” depth	2 each 8.19" depth 1 each 5.7" depth
Slim	1 each	N/A	N/A
Secure Digital (SD) Reader	1 each	N/A	N/A
Internal HDD Bays	1 each 2.5” drives	1 each 3.5” drives	3 each 3.5” drives

Controller	**USDT**	**SFF**	**CMT**
Hard Drive Controller	These systems provide up to four serial ATA (SATA) interfaces that support transfer rates up to 6.0 Gb/s (for ports 0 and 1, 3 Gb/s on all others) and RAID data protection functionality. These systems can also support an external SATA (eSATA) device through an optional bracket/cable assembly (does not apply to USDT).		
SATA Interfaces	2 ea. SATA 3.0	2 ea. SATA 3.0 1 ea. SATA 2.0 1 ea. eSATA	2 ea. SATA 3.0 2 ea. SATA 2.0 1 ea. eSATA
Host SATA Controller	Advanced Host Controller Interface (AHCI) Revision 1.2. The specification includes a description of the hardware/software interface between system software and the host controller hardware.		

Unit Environment and Operating Conditions

General Unit Operating Guidelines

- Keep the computer away from excessive moisture, direct moisture and the extremes of heat and cold, to ensure that unit is operated within the specified operating range.
- Leave a 10.2 cm (4 in) clearance on all vented sides of the computer to permit the required airflow.
- Never restrict airflow into the computer by blocking any vents or air intakes.
- Do not stack computers on top of each other or place computers so near each other that they are subject to each other's re-circulated or preheated air.
- Occasionally clean the air vents on the front, back, and any other vented side of the computer. Lint, dust and other foreign matter can block the vents and limit the airflow.
- If the computer is to be operated within a separate enclosure, intake and exhaust ventilation must be provided on the enclosure, and the same operating guidelines listed above will still apply.

Temperature Range	Operating: 50° to 95° F (10° to 35° C)* Non-operating: –22° to 140° F(–30° to 60° C)
Relative Humidity	Operating: 10% to 90% (non-condensing at ambient) Non-operating: 5% to 95% (non-condensing at ambient)
Maximum Altitude (unpressurized)	Operating: 10,000 ft (3048 m) Non-operating: 30,000 ft (9144 m)

*Operating temperature is de-rated 1.0 deg C per 300 m (1000 ft) to 3000 m (10,000 ft) above sea level, no direct sustained sunlight. Maximum rate of change is 10 deg C/Hr. The upper limit may be limited by the type and number of options installed.

Power Supply	USDT	SFF	CMT
Standard Efficiency	N/A	240W active PFC	320W active PFC
High Efficiency*	Integrated graphics: 135W active PFC 87% efficient Discrete graphics: 180W active PFC 87% efficient	240W active PFC 87/90/87% efficient at 20/50/100% load	320W active PFC 87/90/87% efficient at 20/50/100% load
Operating Voltage Range	90 - 264 VAC	90 - 264 VAC	90 - 264 VAC
Rated Voltage Range	100 - 240 VAC	100 - 240 VAC	100 - 240 VAC
Rated Line Frequency	50/60 Hz	50/60 Hz	50/60 Hz
Operating Line Frequency Range	47 – 63 Hz	47 – 63 Hz	47 – 63 Hz
Rated Input Current	N/A	4A	5.5A
Rated Input Current with Energy Efficient* Power Supply	135W: 2.4A 180W: 2.9A	4A	5.5A
Current Leakage (NFPA 99)	< 250 µA	< 275 µA	< 450 µA
Power Supply Fan	N/A	92mm variable speed	92mm variable speed
Power cord length	N/A	6.0 ft. (1.83 m)	6.0 ft. (1.83 m)
External Power Adapter Dimensions	6.7 x 2.6 x 1.5 in	N/A	N/A

Technical Specifications

Total Cord Length	12 ft 8 in	N/A	N/A

*High efficiency power supply is a requirement for ENERGY STAR qualification in conjunction with a select range of processors and modules

ROM BIOS Information

Key features of the HP BIOS include:

- Deployment and manageability – HP BIOS provides several technologies that help integrate the HP Compaq 8200 Elite Series PC into the enterprise, such as PXE, remote configuration, remote control, and F10 Setup support for 12 languages.
- Select models feature either Intel Standard Manageability or Intel Core vPro Processor Technology.
- Stability – HP BIOS supports the HP stable product roadmap by releasing only critical BIOS changes to the factory and advanced change notification.
- Support UEFI specification 2.1
- Computrace agent – For tracking and tracing services, available in select countries, separate software and purchase of a subscription is required.
- Thermal and power management – The HP BIOS provides and enables thermal and power management technologies so component temperatures are managed for high reliability and to assist in operating the HP Business Desktop computer in any enterprise environment.
- Acoustic performance – Industry leading acoustic emissions across the range of operating conditions.
- Serviceability – HP BIOS provides diagnostic and detailed service information.
- Upgrades and recovery – HP BIOS provides numerous ways to upgrade HP Business Desktop computers, including BIOS updates from within DOS (DOSFlash), BIOS updates from within Windows (HPQFlash), HP Client Manager, and fail-safe recovery. In addition, the HP Business Desktop BIOS Utilities tool enables replicated BIOS setup throughout the Enterprise; it is available from within the BIOS software and from the support website.
- HP BIOS uses PKI signing of the BIOS for trusted BIOS upgrades and recovery.

Additional HP BIOS Features

- Power-On password – Helps prevent an unauthorized user from powering on the system.
- Administrator password – Also known as the setup password, this helps prevent unauthorized changes to the system configuration. If the administrator password is not known, the BIOS version cannot be changed and changes cannot be made to BIOS settings using F10 setup or under the OS.
- Advanced Configuration and Power Interface (ACPI) – Represents a significant innovation in power and configuration management, allowing operating systems and applications to manage power based on activity and usage. HP Elite models use ACPI to provide power conservation features.
- S5 Max Power Savings setting supports EU Lot6 requirement and allows the computer to power down below 1W is S5 (when turned off). When S5 Max Power Savings feature is enabled power to slots is turned off along with WOL functionality.

Other Features

- Advanced Configuration and Power Management Interface (ACPI). Allows the system to wake from a low power mode. Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system.
- System Management BIOS v2.6
- Intel Wired for Management support; industry wide initiative to make Intel architecture based PCs, servers and mobile computers more inherently manageable out-of-the-box and over the network
- Dual State Power Button; acts as both an on/off button and a suspend-to-sleep button

Technical Specifications

Serviceability Features

- Dual colored power LED on front of computer to indicate either normal or fault condition
- Diagnostic LED Explanation Table:
  - Number of 1-second red LED blinks followed by a 2-second pause, then repeats:
    - 2 - processor thermal protection activated
    - 3 - processor not installed
    - 4 - power supply failure
    - 5 -- memory error
    - 6 - video error
    - 7 - PCA failure (ROM detected failure prior to video)
    - 8 - invalid ROM, bootblock recovery mode
    - 9 - system not fetching code
    - 10 - system hang while loading an option ROM
- System/Emergency ROM
- Flash ROM
- CMOS Battery Holder for easy replacement
- Flash Recovery with Video Configuration Record Software
- 5 Aux Power LED on System PCA
- Processor ZIF Socket for easy Upgrade
- Over-Temp Warning on Screen (Requires IM Agents)
- Clear Password Jumper
- DIMM Connectors for easy Upgrade
- Clear CMOS Button
- NIC LEDs (integrated) (Green & Amber)
- Dual Color Power and HD LED - To Indicate Normal Operations and Fault Conditions
- Color coordinated cables and connectors
- Tool-less Hood Removal
- Front power switch
- System memory can be upgraded without removing the system board or any internal components
- Tool-less Hard Drive, CD & Diskette Removal
- Green Pull Tabs, and Quick Release Latches for easy Identification

Additional Features

	Description
Computrace	Computrace agent support standard
Towerable Orientation	Product can be oriented as either a desktop or a tower
Drive Protection System	DPS Access through F10 Setup during Boot
	A diagnostic hard drive self test. It scans critical physical components and every sector of the hard drive for physical faults and then reports any faults to the user
	Running independently of the operating system, it can be accessed through a Windows-based diagnostics utility or through the computer's setup procedure. It produces an evaluation on whether the hard drive is the source of the problem and needs to be replaced
	The system expands on the Self-Monitoring, Analysis, and Reporting Technology (SMART), a continuously running systems diagnostic that alerts the user to certain types of failures
SMART Technology (Self-Monitoring, Analysis and Reporting Technology)	Allows hard drives to monitor their own health and to raise flags if imminent failures were predicted

Technical Specifications

SMART I - Drive Failure Prediction	Predicts failures before they occur. Tracks fault prediction and failure indication parameters such as re-allocated sector count, spin retry count, calibration retry count
SMART II - Off-Line Data Collection	By avoiding actual hard drive failures, SMART hard drives act as "insurance" against unplanned user downtime and potential data loss from hard drive failure
SMART III - Off-Line Read Scanning with Defect Reallocation	IOEDC: I/O Error Detection Circuitry Detects errors in Read/Write buffers on HDD cache RAM
SMART IV - End-to-End CRC for hard drives	Interface in F10 setup provides confirmation of SMART IV support.

Technical Specifications - Audio

High Definition Audio

Type	Integrated
HD Stereo Codec	Realtek 2-channel ALC261 codec
Audio I/O Ports	Front microphone-In (150-K ohm Input Impedance) Rear Line-In/Microphone input (150-K ohm Input Impedance, function is configurable by audio driver) Rear Line-Out* (190 ohms Output Impedance, expects at least a 10-K ohm load) Front Headphone-Out (0.5 Ohm Output Impedance, expects at least a 32 ohm load) Front Microphone/Headphone jack is re-task able to provide Microphone input, line-in or Headphone output to support connecting two headphones to the front of the system. When configured as a second front headphone output, both front headphone outputs are always driven with the same signal. All ports are 3.5mm
Internal Speaker Amplifier	1.5W amplifier for the internal speaker only. External speakers must be powered externally. Rear Line-in audio port is re-taskable as either Line-in or Microphone-In.
Multi-streaming Capable	Multi-streaming can be enabled in the Realtek control panel to allow independent audio streams to be sent to/from the front and rear jacks.
Sampling	8 kHz - 192 kHz
Wavetable Syntheses	Yes – Uses OS soft wavetable
Analog Audio	Yes
# of Channels on Line-Out	Stereo (Left & Right channels)
Internal Speaker	Yes
External Speaker Jack	Yes

HP Thin USB Powered Speakers

On/Off/Volume Controls	Right side of right speaker
Power LED	Front of right speaker (green)
Frequency Response	FO to 20kHz
Watts	2/3 watt (normal/maximum)
Dimensions/Speaker (H x W x D)	5.72 x 3.74 x 0.96 in 14.52 x 9.50 x 2.45 cm
Net Weight	0.68 lbs 0.31kg
Color	Black
Environmental (all conditions non-condensing)	**Operating Temperature:** 14° to 104° F (-10° to 40° C) **Relative Humidity** 40% to 90%
Speaker Cable Length	**Input Cord:** 5.91 ft (1800 mm) **L-channel Cord:** 3.28 ft (1000 mm) **USB Cord:** 5.91 ft (1800 mm)

SRS Premium Sound Technology

SRS Premium Sound™ is a state-of-the-art solution suite which optimizes the audio experience for all business applications including VoIP, computer based training, business presentations and digital content creation for any speaker configuration (notebook / desktop speakers or headphones). SRS Premium Sound delivers natural and immersive surround sound complete with deep, enveloping bass and crystal clear dialog which allows users to clearly hear audio and voice in communications or presentations and ensures that digital content can be experienced with uncompromised quality.

SRS Premium Sound Features

- Premium audio experience for all applications including VoIP, Video Conferencing, Webcasts, Multimedia Presentations and Digital Content Creation
- Natural and Immersive sound from two speakers or headphones
- Custom-tuned solutions to provide superior natural sound from desktop speakers and headphones
- Crystal clear dialog
- Deep, rich bass
- Intuitive user interface with presets for ease of use

SRS Premium Sound Benefits

- Turn your desktop into a multimedia powerhouse!
- Bring your business communication to life with natural sounding voice and clear dialog
- Increase productivity by making computer based training, webcasts and VoIP available anytime and anywhere with crystal clear audio
- Make presentations shine with rich, expansive sound without the need for external speakers
- Take digital content creation to a new level with deep bass, enhanced fidelity and immersive surround sound which ensures that your content is heard with uncompromised quality and detail

Intel 82579LM GbE Network Connection (integrated)

Connector	RJ-45
System Interface	Integrated on PCA
Controller	Intel 82579LM GbE platform LAN connect networking controller
Memory	24 KB FIFO packet buffer memory
Data rates supported	10/100/1000 Mbps
IEEE Compliance	802.1P 802.1Q 802.2 802.3 802.3ab 802.3az 802.3u
Bus architecture	PCI Express and SMBus
Data transfer mode	PCIe-based interface for active state operation (S0 state) and SMBus for host and management traffic (Sx low power state)
Power requirement	Requires 3.3V and 1.05V or just 3.3V with integrated regulators Power consumption 0.697 Watts
Boot ROM support	Yes
Network transfer mode	Full-duplex Half-duplex (not supported for the 1000BASE-T transceiver)
Network transfer rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps
Environmental	Operating Temperature: 0° to 85° C Operating Humidity: 60% RH
Management	WOL, auto MDI crossover, PXE, Muti-port teaming, RSS, Advanced cable diagnostic.
Alerting	ASF 2.0 support; AMT 7.0 support

Technical Specifications - Communications

Intel Gigabit CT Desktop Network Interface Controller

Connector	RJ-45
System Interface	PCI Express x1
Controller	Intel WG82574L Gigabit Ethernet Controller
Memory	Integrated Dual 48K configurable transmit receive FIFO Buffers
Data rates supported	10/100/1000 Mbps
Compliance	IEEE 802.1P, 802,1Q, 802.2, 802.3, 802.3AB and 802.3u compliant, 802.3x flow control
Bus architecture	PCI-E 1.0a
Data path width	X1, 250 MB/s, Bi-directional interface
Data transfer mode	Bus-master DMA
Hardware certifications	FCC, B, CE, TUV- cTUVus Mark Canada and United States, TUV- GS Mark for European Union
Power requirement	Aux 3.3V, 3.0 Watts in 1000base-T and 2.0 Watts in 100Base-T
Boot ROM support	Yes
Network Transfer Rate	10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps 100BASE-TX (half-duplex) 100 Mbps 100BASE-TX (full-duplex) 200 Mbps 1000BASE-T (full-duplex) 2000 Mbps (actual rate limited by PCI Bus)
Environmental	Operating Temperature: 32° to 131°F (0° to 55° C) Operating Humidity: 85% at 131° F (55° C)
Dimensions	4.75 x 2.25 x 0.8 in (12.1 x 5.7 x 2.0 cm)
Management	WOL, PXE, DMI, WFM 2.0

HP 802.11 b/g/n Wireless Network Connection

Dimensions (L x H)	2.8 x 2.2 in (7.0 x 5.7 cm)
Weight	0.08 lbs (40 g)
Controller	Ralink RT2790
System interface	PCI Express x1
Network standard	802.11 b/g/n
Frequency band	2.400 - 2.497 GHz
Operating temperature	14° to 149°F, operating (-10° to 65°C, operating)
Storage temperature	-40° to 176°F, non-operating (-40° to 80°C, non-operating)
Humidity	10-90% operating 5-95% non-operating
Operating voltage	3.3V +/- 9% 12V +/- 8%

Technical Specifications - Communications

	Platform/WLAN Mode	Power Consumption
Power Consumption	Maximum Power Consumption:	10 Watts
	Transmit Only	4 Watts maximum averaged power over 1 second
	Transmit Packet or Active Scanning	1000 mA peak current for 100 microseconds or longer
	Receive Only Mode or Idle without IEEE PSP mode enabled	3 Watts maximum averaged over 1 second
	Idle, with IEEE PSP mode enabled	1.0 Watts maximum averaged over 1 second
	Transmit Disabled (turned off in software)	50 mW maximum, averaged over 1 second
	Platform in S3 or S4 (power removed from Low Profile PCI Express Card)	5 mW maximum, averaged over 1 second
Output Power (approximate)	802.11b mode	+19 dBm +/- 1.0 dB maximum
	802.11g mode	+17 dBm +/- 1.0 dB maximum
	EWC mode	+17 dBm +/- 1.0 dB maximum (total power in all transmit chains)
Security	IEEE and WiFi compliant 64 / 128 bit WEP encryption	
	AES: CCM	
	802.1x authentication	
	WPA: 802.1x. WPA-PSK and TKIP	
	WPA2 certification	
	IEEE 802.11i	
	Cisco Certified Extensions, all versions through V5	
Antenna	HP part number 497317-003	
Certifications	Wi-Fi certified	
Certifications for use by country	United States, Canada, Peru, Taiwan	

Intel Centrino Advance-N 6205 Wireless Network Interface Connection (USDT only)

Wireless LAN Standards	IEEE 802.11a/b/g/n
	IEEE 802.11 e, 802.11i, 802.11d, 802.11d, 802.11h
Interoperability	Wi-Fi certified (802.11 a/b/g/n WMM, WPA, WPA2 and WPS)
	Tested with wireless access points from several major manufacturers
	OS compatible with Microsoft Windows, Win7, Vista, and XP
	Cisco Compatible Extensions Program compliant (802.11a/b/g only) with Microsoft Windows XP, Windows Vista and Windows 7
Frequency Band	2.4 GHz and 5 GHz
Antenna Structure	2 transmit; 2 receive (2x2)

Technical Specifications - Communications

Data Rates	802.11b: 1, 2, 5.5, 11 Mbps	
	802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps	
	802.11n: 66 possible data rates, ranging from 6 Mbps to 300 Mbps, depending on the combination of Bandwidth, Modulation Coding Scheme, and Guard Interval used, as defined in IEEE 802.11n specification	
Modulation	Direct Sequence Spread Spectrum DBPSK, DQPSK, CCK, OFDM, BPSK, QPSK, 16-QAM, 64-QAM	
Security	Supports 64- and 128-bit WEP, WPA, WPA2, hardware-accelerated AES (support for key sizes of 128bits), TKIP, 802.1x authentication types EAP-TLS, EAP-TTLS, PEAP, MSCHAP, PEAP-MSCHAPv2, LEAP, EAP-FAST, EAP-SIM, EAP-AKA PAP, CHAP, TLS, GTC	
	Support for Cisco Security Features (proven compatibility with Cisco Aironet infrastructure products through the Cisco Compatible Extensions Program Version 4) with Microsoft Windows Vista and XP only.	
Sub-channels	Multinational support with frequency bands and channels compliant to local regulations.	
Media Access Protocol	CSMA/CA (Collision Avoidance) with ACK	
Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required) Intel® My Wifi Technology (iPAN)	
Roaming	Provide seamless roaming between like access points (same frequency band)	
Output Power (for CCK)	15 dBm	
Output Power (for OFDM; power varies by data rate)	15 dBm	
Power Consumption	Transmit: 2.3 Watts (average, with one spatial streams)	
	Receive: 1.9 Watts (average with two receive chains)	
	Idle mode: 30mW – 40mW (average)	
	Radio off: 20 mW (max)	
Power Management	ACPI compliant power management 802.11 compliant power saving mode	
Antenna Connections	3 U.FL type connectors, 50 ohm nominal impedance	
Range	802.11 a - Typical (@6 Mbps)	600 feet - Outdoor Open Area 150 feet - Indoor, Office environment
	802.11 b - Typical (@1 Mbps)	1200 feet - Outdoor Open Area 300 feet - Indoor, Office environment
	802.11 g - Typical (@1 Mbps)	1200 feet - Outdoor Open Area 300 feet - Indoor, Office environment
Form Factor	MiniPCI-Express	
Weight	0.013 lb (4.0 g)	
Dimensions	1.1 x 1.2 in (26.8 x 30.0 mm)	
Operating Voltage	3.3V +/- 9%, 1.5V +/- 5%	
Temperature	**Operating:**	32° to 176° F (0° to 80° C)
	Non-operating:	-40° to 176° F (-40° to 80° C)
Humidity	**Operating:**	10% to 90% (non-condensing)
	Non-operating:	5% to 90% (non-condensing)

Technical Specifications - Communications

	Microsoft Windows XP	Microsoft Windows Vista and Win 7
Configuration Utility	• Microsoft Windows XP Wireless Network Connection Manager • Intel PROSet for Microsoft Windows XP (required for Cisco Compatible Extensions support)	• Microsoft Windows Vista Wireless Network Connection Manager • Intel IHV extensions for Win7 and Vista available to support Cisco Compatible Extensions

Intel HD Graphics 2000/3000

3D/2D Controller	Microsoft DirectX 10.1 based with support for Pixel Shader 4.1
VGA Controller	Integrated
DisplayPort	v1.1a; integrated, multimode capable; supports HDCP and audio over DisplayPort
Bus Type	Intel® Flexible Display Interface (Intel® FDI) - a proprietary link for carrying display traffic from the Processor Graphics controller to the PCH display I/Os.
Memory	Intel graphics do not have dedicated memory but utilizes some of the computer's system memory The amount of memory used for graphics depending on the amount of system memory installed, BIOS settings, operating system, and system load. 32 MB is pre-allocated for graphics use at system boot time. Additional memory can be allocated at boot time by the BIOS for PAVP (Protected Audio Video Playback) support for playback of protected video content. Additional memory is allocated for graphics as needed using Intel's Dynamic Video Memory Technology (DVMT), to provide an optimal balance between graphics and system memory use.
Maximum Graphics Memory	Microsoft Windows XP: Up to 1GB Microsoft Windows Vista: Up to 1.7GB Microsoft Windows 7: Up to 1.7GB Note: the actual amount of maximum graphics memory can be less than the amounts listed above depending upon your computer's configuration.
HW Video Decode	Hardware Accelerated decode for MPEG2 encrypted video; support for PAVP
Maximum Color Depth	32 bits/pixel
Multi-display Support	Integrated dual independent monitor support facilitated via one VGA port and one DisplayPort v1.1a integrated on the back plane of the system board and presented as part of the rear I/O set of interfaces. Support for DVI, HDMI, dual link DVI or second VGA monitor provided by optional HP DisplayPort adapters. (see complete listing of available optional adapters elsewhere in this QuickSpec). Small Form Factor and Tower systems can support greater than two monitors with the addition of an optional PCI Express discrete graphics card. Both the integrated graphics and PCIe discrete graphics can be utilized simultaneously. The Ultra-slim Desktop only supports MXM graphics cards which do not provide additional video output ports, therefore will not provide this functionality.
Graphics/Video API Support	DirectX 10.1 support in hardware OpenGL 3.0 support in hardware

Display Resolutions and Refresh Rates

NOTE: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Resolution	Maximum Refresh Rates (Hz)	
	Analog	Digital
640x480	85	60
800x600	85	60
1024x768	85	60
1280x720	85	60
1280x1024	85	60
1440x900	75	60
1600x900	75	60

1600x1200	85	60
1680x1050	75	60
1920x1080	85	60-R
1920x1200	85	60-R
1920x1440	85	N/A
2048x1536	75	N/A
2560x1600	N/A	60*

* Only supported when using a DisplayPort connection

NOTE: other resolutions may be available but are not recommended as the may not have been tested and qualified by HP

NOTE: 60-R denotes reduced blanking timings are used on single-link DVI connections and may be used with other digital connections

AMD FirePro 2270 Graphics Card

Form Factor	PCI Express x16 (generation 2.0) Low Profile, half length, 2.3" x 6.6" Full height bracket utilized when configured to CMT or MT
Graphics Controller	AMD FirePro 2270 GPU
Output Connector	Single DMS-59 connector Supports dual analog displays with included DMS-59 to dual VGA Y cable. Supports dual digital displays with optional DMS-59 to dual DVI cable. Supports dual DisplayPort displays with optional DMS59 to dual DisplayPort cable.
Core Clock	600MHz
Memory Clock	600MHz
Memory Frame Buffer	512MB, DDR3, 64-bit wide
Supported Graphics APIs	DirectX 11 support in hardware OpenGL 4.0 support in hardware

Display Resolutions and Refresh Rates

NOTE: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Resolution	**Maximum Refresh Rate (Hz)**	
	Analog	**Digital**
640 x 480	85	60
800 x 600	85	60
1024 x 768	85	60
1280 x 720	85	60
1280 x 1024	85	60
1440 x 900	75	60
1600 x 1200	85	60
1680 x 1050	75	60
1920 x 1080	85	60-R
1920 x 1200	85	60-R
1920 x 1440	85	N/A
2048 x 1536	75	N/A

Technical Specifications - Graphics

NOTE: 60-R denotes reduced blanking timings are used on single link DVI connections and may be used with other digital connections.

AMD Radeon HD 5450 Graphics Card

Form Factor	MXM 3.0 A
Engine Clock	650 MHz
Memory Type	DDR3
Memory Data Rate	800 MHz
Memory Size (width)	512 MB (64 bit)
3D API support	DX11, SM 5
LVDS support	Yes
Output Connectors	VGA & DisplayPort 1.1 supporting dual independent displays
HDCP support	yes
HDMI support	1.3 compatible
BD support	• Full rate playback @ max. resolution of display • Full sub-video support w/o frame drops • Full BDJ or iHD support w/o frame drops
Total Power Consumption	25W

AMD Radeon HD 6350 Graphics Card

Form Factor	PCI Express x16 (generation 2.0) Low Profile, half length, 2.3" x 6.6" Full height bracket utilized when configured to CMT or MT
Graphics Controller	AMD HD 6350 GPU
Output Connector	Single DMS-59 connector Supports dual analog displays with included DMS-59 to dual VGA cable. Supports dual DVI displays with optional DMS-59 to dual DVI cable.
Core Clock	650MHz
Memory Clock	800MHz
Memory Frame Buffer	512MB, DDR3, 64-bit wide
Supported Graphics APIs	HDCP supported on DVI output using optional DMS-59 to dual DVI cable. DirectX 11 support in hardware. OpenGL 4.0 support in hardware.

Display Resolutions and Refresh Rates

NOTE: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Resolution	**Maximum Refresh Rate (Hz)**	
	Analog	**Digital**
640 x 480	85	60
800 x 600	85	60
1024 x 768	85	60
1280 x 720	85	60

1280 x 1024	85	60
1440 x 900	75	60
1600 x 1200	85	60
1680 x 1050	75	60
1920 x 1080	85	60-R
1920 x 1200	85	60-R
1920 x 1440	85	N/A
2048 x 1536	75	N/A

NOTE: 60-R denotes reduced blanking timings are used on single link DVI connections and may be used with other digital connections.

AMD Radeon HD 6450 Graphics Card

Form Factor	PCI Express x16 (Generation 2.0) Low Profile, half length, 2.3" x 6.6" Full height bracket utilized when configured to CMT or MT
Graphics Controller	AMD HD 6450 GPU
Output Connector	One (1) DisplayPort1.1 One (1) Dual Link DVI-I Includes a DVI to VGA adapter. Other optional adapter kits are available to support DVI-D, and HDMI monitor inputs (see a complete listing of available optional adapters elsewhere in this QuickSpec). Supports audio with video through the DisplayPort 1.1 connector. DisplayPort v1.2 support will be provided in a future driver update.
Core Clock	625MHz
Memory Clock	800MHz
Memory Frame Buffer	512MB, DDR3, 64-bit wide
Display Maximum Resolution	Digital: 2560 x 1600 Analog: 2048 x 1536 (see chart below for more resolutions)
Supported Graphics APIs	HDCP supported on DisplayPort 1.1 and DVI output. DirectX 11 support in hardware.

Display Resolutions and Refresh Rates

NOTE: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Resolution	**Maximum Refresh Rate (Hz)**	
	Analog	**Digital**
640 x 480	85	60
800 x 600	85	60
1024 x 768	85	60
1280 x 720	85	60
1280 x 1024	85	60
1440 x 900	75	60
1600 x 1200	85	60
1680 x 1050	75	60
1920 x 1080	85	60-R

1920 x 1200	85	60-R
1920 x 1440	85	60*
2048 x 1536	75	60*
2560 x 1600	N/A	60*

* Only supported when using a dual link DVI or DisplayPort monitor connection

NOTE: 60-R denotes reduced blanking timings are used on single link DVI connections and may be used with other digital connections.

AMD Radeon HD 6570 Graphics Card

Form Factor	PCI Express x16 (generation 2.0) Full height for CMT or MT chassis.
Graphics Controller	AMD HD 6570 GPU
Output Connector	Two (2) DisplayPort 1.1 One (1) Dual Link DVI-I Includes a DVI-I to VGA adapter. Other optional adapter kits are available to support DVI-D, and HDMI monitor inputs (see complete listing of available optional adapters elsewhere in this QuickSpec). Supports audio with video through the DisplayPort 1.1 connector. Audio is also supported with an optional DisplayPort to HDMI Adapter. DisplayPort 1.2 support will be provided in a future driver update.
Core Clock	650MHz
Memory Clock	900MHz
Memory Frame Buffer	1GB of DDR3,128-bit wide
Supported Graphics APIs	HDCP supported on DisplayPort and DVI output. DirectX 11 support in hardware. OpenGL 4.0 support in hardware

Display Resolutions and Refresh Rates

NOTE: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Resolution	**Maximum Refresh Rate (Hz)**	
	Analog	**Digital**
640 x 480	85	60
800 x 600	85	60
1024 x 768	85	60
1280 x 720	85	60
1280 x 1024	85	60
1440 x 900	75	60
1600 x 1200	85	60
1680 x 1050	75	60
1920 x 1080	85	60-R
1920 x 1200	85	60-R
1920 x 1440	85	60
2048 x 1536	75	60
2560 x 1600	N/A	60

NOTE: 60-R denotes reduced blanking timings are used on single link DVI connections and may be used with other digital connections.

NVIDIA NVS 295 Graphics Card

Form Factor	PCI Express x16 (generation 2.0) Low Profile, half length, 2.3" x 6.6" Full height bracket utilized when configured to CMT or MT
Graphics Controller	NVIDIA NVS 295 Graphics Board
Output Connectors	Two (2) DisplayPort Includes two (2) DisplayPort to VGA Adapters
Memory Frame Buffer	256 MB DDR3 SDRAM
Display Output	Drives DisplayPort enabled digital displays at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking Drives DVI enabled digital displays at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking (through DisplayPort to DVI-D (single link) cable)
Supported Graphics APIs	OpenGL 3.0 in hardware DirectX 10.0 in hardware

NVIDIA NVS 300 Graphics Card

Form Factor	PCI Express x16 (generation 2.0) Low Profile, half length, 2.3" x 6.6" Full height bracket utilized when configured to CMT or MT
Graphics Controller	Nvidia GT218 GPU
Memory Frame Buffer	512MB DDR3, 64-bit wide
Output Connectors	Single DMS-59 connector Supports dual analog displays with included DMS-59 to dual VGA Y cable. Supports dual DVI displays with an optional DMS59 to dual DVI cable.
Core Clock	520MHz
Memory Clock	790MHz
Supported Graphics APIs	OpenGL 3.3 support in hardware DirectX 10.0 support in hardware

Display Resolutions and Refresh Rates

NOTE: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Resolution	Maximum Refresh Rate (Hz)	
	Analog	**Digital**
640 x 480	85	60
800 x 600	85	60
1024 x 768	85	60
1280 x 720	85	60
1280 x 1024	85	60
1440 x 900	75	60
1600 x 1200	85	60
1680 x 1050	75	60

1920 x 1080	85	60-R
1920 x 1200	85	60-R
1920 x 1440	85	N/A
2048 x 1536	75	N/A

NOTE: 60-R denotes reduced blanking timings are used on single link DVI connections and may be used with other digital connections.

NVIDIA NVS 310 Graphics Card

Introduction

The NVIDIA® NVS™ 310 Graphics Card is a PCI Express low profile form factor graphics add-in card targeted as an active low cost graphics solution for the corporate business and enterprise markets.

The NVIDIA® NVS 310 graphics card is an ideal solution for customers requiring a small form factor graphics add-in card for either standard or small form factor PC designs.

Performance and Features

The NVIDIA® NVS 310 Graphics Card offers 512 MB of ultrafast DDR3 memory and is capable of supporting up to 2 displays.

- DisplayPort connector supports multimode technology to support connection to DVI-D, VGA and HDMI monitors with optional adapters in kits NR078AA, FH973AT, BP937AA, AS615AA.
- For a DisplayPort to DisplayPort connections use the optional DisplayPort Cable Kit VN567AA.

Form Factor (H x L)	Low Profile: 2.713 × 6.15 in
Bus Type	PCI Express x16, 2.0 compliant
Graphics Controller	NVIDIA® NVS 310
Memory Size	512 MB DDR3
Memory Clock	875MHz
Memory Bandwidth	14 GB/s
Connectors	2 x DisplayPort 1.2
Maximum Resolution	Up to 2560 x 1600 (digital display) per display.
Display Output	Up to 2 displays in the following configurations DisplayPort output: • Drives two DisplayPort enabled digital display at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking, when connected natively using the 2 DisplayPort connectors on the NVS 310 graphics card • Supports 2 monitors up to resolution of 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort 1.2 multi stream topology technology. DVI-D output: • Drives two digital display at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort to DVI-D single-link cable adaptors • Drives two digital display at resolutions up to 2560× 1600 at 60 Hz with reduced blanking using DisplayPort to DVI-D dual-link cable adaptors

HDMI output:

- NVS 310 is capable of driving two high definition (HD) panels up to resolutions of 1920 × 1080P at 60 Hz using DisplayPort to HDMI cable adaptors

VGA display output:

- Drives two analog display at resolutions up to 1920 × 1200 at 60 Hz using DisplayPort to VGA cable adaptors

Max. Power 19.5 W

Display Resolutions and Refresh Rates

Note: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Resolution	Maximum Refresh Rates (Hz) by Connection			
	DisplayPort to VGA	DisplayPort to DVI-D	DisplayPort to HDMI	DisplayPort
640 x 480	85	60	60	60
800 x 600	85	60	60	60
1024 x 768	85	60	60	60
1280 x 720	85	60	60	60
1280 x 1024	85	60	60	60
1440 x 900	75	60	60	60
1600 x 1200	60	60	60	60
1680 x 1050	60	60	60	60
1920 x 1080	60-R	60-R	60	60
1920 x 1200	60-R	60-R		60
1920 x 1440				60
2048 x 1536				60
2560 x 1600				60

Note: 60-R denotes reduced blanking timings are used on single link DVI connections and may be used with other digital connections.

NVIDIA GeForce 405 Graphics Card

Form Factor PCI Express x16 (Generation 2.0)
Low Profile, half length, 2.3" x 6.6"
Full height bracket utilized when configured to CMT or MT

Graphics Controller NVIDIA GeForce 405

Output Connectors One (1) VGA analog
One (1) DVI-I digital

Memory Frame Buffer 512MB DDR3, 64-bit wide

Maximum Resolution Analog: 1920 x 1440 x 32bpp @ 75Hz
Digital: 1600 x 1200 x 32bpp @ 60Hz

Introduction:

HP Serial Advanced Technology Attachment (SATA) Hard Drives maximize the performance of HP Business PCs by providing the technologies to meet your increasing storage demands with high-capacity drives offering superior reliability and performance.

SATA provides faster data transfer speeds, better system cooling airflow, more bandwidth, more headroom for speed increases in future generations and better data integrity. A next-generation technology, the SATA interface connects hard drives to the PC platform enabling easy aggregation of multiple hard drives into a single PC. This offers you the additional benefits of dedicated bandwidth, the ability to more easily identify device failures and scalability. The HP Compaq 8200 Elite Series supports the latest SATA 6.0Gb/s specification.

HP Drive Lock

HP Serial ATA Hard Drives offer enhanced security via a new Drive Lock. When enabled, this ATA security feature set prevents software access to user data on the drive until one or two user-defined passwords are provided.

SMART IV Technology

Self Monitoring Analysis and Reporting Technology (SMART) hard drive technology allows hard drives to monitor their own health and to raise flags if imminent failures are predicted. If the drive determines that a failure is imminent, the SMART hard drive technology enables the intelligent manageability or management software to generate a fault alert. While the current versions of SMART hard drives do a good job monitoring the data on the hard drive media, the ever increasing emphasis on reliability and quality has promoted HP to implement SMART IV technology which constantly checks that the data flow from host interface to media and media to host interface is not compromised. This is accomplished by inserting a 2 byte parity code into every 512 byte block in the data path of the hard drive's Cache RAM. This unique parity checking performed by HP's SMART IV technology hard drives, allows for more complete error detection coverage encompassing the entire data path between the host and the hard drive.

Smart IV is also known as IOEDC: I/O Error Detection Code.

Native Command Queuing

NCQ or Native Command Queuing is a SATA protocol extension that allows the hard drive to have several write or read commands outstanding at the same time. In contrast, normal non-queued operation requires each command to be completed before the next command is issued by the host system. Queuing allows the drive to complete the commands in the order that allows for best overall throughput. It also involves an advanced method of transferring data to or from the host, called First Party Direct Memory Access (FPDMA), which allows the hard drive and the host controller to manage the data transfers for multiple outstanding commands, without involving the host processor. NCQ can contribute to better performance but the results are dependent on many factors, including the access patterns of the various applications and operating system functions that are initiating drive accesses. Enabling NCQ features in the hard drive requires AHCI support from the host system BIOS, controller, and driver. AHCI support is typically implemented in RAID configurations.

NOTE: GB = 1 billion bytes. Actual available capacity is less.

Technical Specifications – Hard Disk Data Storage

HP 160-GB 7.2K SATA 3.0Gb/s 2.5" Hard Disk Drive

Capacity	160,041,885,696 bytes
Rotational Speed	7,200 rpm
Interface	Serial ATA 2.0 (3.0 Gb/s)
Buffer Size	16 MB
Logical Blocks	312,581,808
Seek Time (typical reads, includes controller overhead, including settling)	**Single Track:** 2.0 ms **Average:** 12 ms **Full-Stroke:** 22 ms
Height (nominal)	0.374 in/9.5 mm
Width (nominal)	Media diameter: 2.5 in/63.5 mm Physical size: 2.75 in/70 mm
Operating Temperature	41° to 131° F (5° to 55° C)

HP 160-GB 10K SATA 3.0Gb/s 2.5" Hard Disk Drive

Capacity	160,041,885,696 bytes
Rotational Speed	10,000 rpm
Interface	Serial ATA 2.0 (3.0 Gb/s)
Buffer Size	16 MB
Logical Blocks	312,581,808
Seek Time (typical reads, includes controller overhead, including settling)	**Single Track:** 2.0 ms **Average:** 12 ms **Full-Stroke:** 22 ms
Height (nominal)	0.6 in (1.53 cm)
Width (nominal)	Media diameter: 2.5 in/63.5 mm Physical size: 2.75 in/70 mm
Operating Temperature	41° to 131° F (5° to 55° C)

Technical Specifications – Hard Disk Data Storage

HP 250-GB 7.2K SATA 3.0Gb/s 2.5" Hard Disk Drive

Capacity	250,059,350,016 bytes
Rotational Speed	7,200 rpm
Interface	Serial ATA 2.0 (3.0 Gb/s)
Buffer Size	8 MB
Logical Blocks	488,397,168
Seek Time (typical reads, includes controller overhead, including settling)	**Single Track:** 2.0 ms **Average:** 12 ms **Full-Stroke:** 22 ms
Height (nominal)	0.374 in/9.5 mm
Width (nominal)	Media diameter: 2.5 in/63.5 mm Physical size: 2.75 in/70 mm
Operating Temperature	41° to 131° F (5° to 55° C)

HP 250-GB 7.2K SATA 6.0Gb/s 3.5" Hard Disk Drive

Capacity	250,059,350,016 bytes
Rotational Speed	7,200 rpm
Interface	Serial ATA 3.0 (6.0 Gb/s)
Buffer Size	8 MB
Logical Blocks	488,397,168
Seek Time (typical reads, includes controller overhead, including settling)	**Single Track:** 1.0 ms **Average:** 8.5 ms **Full-Stroke:** 18 ms
Height (nominal)	1 in/2.54 cm
Width (nominal)	Media diameter: 3.5 in/8.89 cm Physical size: 4 in/10.2 cm
Operating Temperature	41° to 131° F (5° to 55° C)

Technical Specifications – Hard Disk Data Storage

HP 300-GB 10K rpm SATA 3.0Gb/s 2.5" Hard Disk Drive

Capacity	300,069,052,416 bytes
Rotational Speed	10,000 rpm
Interface	Serial ATA 2.0 (3.0 Gb/s)
Buffer Size	16 MB
Logical Blocks	586,072,368
Seek Time (typical reads, includes controller overhead, including settling)	**Single Track:** 0.7 ms **Average:** 4.4 ms **Full-Stroke:** 9.5 ms
Height (nominal)	0.6 in (1.53 cm)
Width (nominal)	Media diameter: 2.5 in (6.36 cm) Physical size: 2.75 in (6.99 cm)
Operating Temperature	41° to 131° F (5° to 55° C)

HP 320-GB 7.2K rpm SATA 3.0Gb/s 2.5" Hard Disk Drive

Capacity	320,072,933,376 bytes
Rotational Speed	7,200 rpm
Interface	Serial ATA 2.0 (3.0 Gb/s)
Buffer Size	16 MB
Logical Blocks	488,397,168
Seek Time (typical reads, includes controller overhead, including settling)	**Single Track:** 2.0 ms **Average:** 12 ms **Full-Stroke:** 22 ms
Height (nominal)	0.374 in/9.5 mm
Width (nominal)	Media diameter: 2.5 in/63.5 mm Physical size: 2.75 in/70 mm
Operating Temperature	41° to 131° F (5° to 55° C)

Technical Specifications – Hard Disk Data Storage

HP 320-GB 7.2K rpm SATA 3.0Gb/s 2.5" Self-Encrypting Hard Disk Drive

Capacity	320,072,933,376 bytes
Rotational Speed	7,200 rpm
Interface	Serial ATA 2.0 (3.0 Gb/s)
Buffer Size	16 MB
Logical Blocks	488,397,168
Seek Time (typical reads, includes controller overhead, including settling)	**Single Track:** 2.0 ms **Average:** 12 ms **Full-Stroke:** 22 ms
Height (nominal)	0.374 in/9.5 mm
Width (nominal)	Media diameter: 2.5 in/63.5 mm Physical size: 2.75 in/70 mm
Operating Temperature	41° to 131° F (5° to 55° C)

HP 500-GB 7.2K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive

Capacity	500,107,862,016 bytes
Rotational Speed	7,200 rpm
Interface	Serial ATA 3.0 (6.0 Gb/s)
Buffer Size	16 MB
Logical Blocks	976,773,168
Seek Time (typical reads, includes controller overhead, including settling)	**Single Track:** 2.0 ms **Average:** 11 ms **Full-Stroke:** 21 ms
Height (nominal)	1 in/2.54 cm
Width (nominal)	Media diameter: 3.5 in/8.89 cm Physical size: 4 in/10.2 cm
Operating Temperature	41° to 131° F (5° to 55° C)

Technical Specifications – Hard Disk Data Storage

HP 750-GB 7.2K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive

Capacity	750,107,862,016 bytes
Rotational Speed	7,200 rpm
Interface	Serial ATA 3.0 (6.0 Gb/s)
Buffer Size	16 MB
Logical Blocks	976,773,168
Seek Time (typical reads, includes controller overhead, including settling)	**Single Track:** 2.0 ms **Average:** 11 ms **Full-Stroke:** 21 ms
Height (nominal)	1 in/2.54 cm
Width (nominal)	Media diameter: 3.5 in/8.89 cm Physical size: 4 in/10.2 cm
Operating Temperature	41° to 131° F (5° to 55° C)

HP 1-TB 7.2K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive

Capacity	1,000,204,886,016 bytes
Rotational Speed	7,200 rpm
Interface	Serial ATA 3.0 (6.0 Gb/s)
Buffer Size	32 MB
Logical Blocks	1,953,525,168
Seek Time (typical reads, includes controller overhead, including settling)	**Single Track:** 2.0 ms **Average:** 11 ms **Full-Stroke:** 21 ms
Height (nominal)	1 in/2.54 cm
Width (nominal)	Media diameter: 3.5 in/8.89 cm Physical size: 4 in/10.2 cm
Operating Temperature	41° to 131° F (5° to 55° C)

HP 80-GB Solid State Drive

Unformatted Capacity	80-GB	
Architecture	Multi Level Cell (MLC) NAND Flash with wear leveling 10 channel controller	
Interface	Serial ATA 2.0 (3.0 Gb/s)	
Dimensions (W x H x D)	2.74 x 0.37 x 4 in/6.98 x 0.95 x 10.2 cm	
Weight	0.18 lb/80 g	
Bandwidth Performance	**Sustained Sequential Read:**	Up to 250 MB/s
	Sustained Sequential Write:	Up to 70 MB/s
	Random Read:	Up to 35K IOPs
	Random Write:	Up to 6.6K IOPs
Latency	**Read:**	65-ms
	Write:	85-ms
Power	**DC power requirement:**	5 VDC 5%-100 mV ripple p-p
	Total power consumption:	0.15W (active); 0.075W (idle)
Useful Drive Life	35TB written, up to 20GB/day for 5 years	
Environmental (all conditions, non-condensing)	**Operating Temperature:**	32° to 158° F (0° to 70° C)
	Relative Humidity:	5% to 95%
	Maximum Wet Bulb Temperature (operating):	84° F (29° C)
	Shock:	1,500 G/0.5-ms

NOTE:
For solid state disk drives, GB means 1 billion bytes. 16GB is the unformatted capacity of this drive before a portion of the drive is reserved for flash management features. Actual capacity varies by content and will be less than 15.8GB.

NOTE:
Use of HP System Software Recovery Disks (SSRD) is not supported on 80GB or 128GB SSD models due to minimum image size requirements (>=140GB) for the SSRD.

Technical Specifications – Solid State Data Storage

HP 120-GB Solid State Drive

Unformatted Capacity	120 GB	
Architecture	Multi Level Cell (MLC) NAND Flash with wear leveling 10 channel controller	
Interface	Serial ATA 2.0 (3.0 Gb/s)	
Dimensions (W x H x D)	2.74 x 0.37 x 4 in/6.98 x 0.95 x 10.2 cm	
Weight	0.18 lb/80 g	
Bandwidth Performance	**Sustained Sequential Read:**	Up to 250 MB/s
	Sustained Sequential Write:	Up to 70 MB/s
	Random Read:	Up to 35K IOPs
	Random Write:	Up to 6.6K IOPs
Latency	**Read:**	65-ms
	Write:	85-ms
Power	**DC power requirement:**	5 VDC 5%-100 mV ripple p-p
	Total power consumption:	0.15W (active); 0.075W (idle)
Useful Drive Life	35TB written, up to 20GB/day for 5 years	
Environmental (all conditions, non-condensing)	**Operating Temperature:**	32° to 158° F (0° to 70° C)
	Relative Humidity:	5% to 95%
	Maximum Wet Bulb Temperature (operating):	84° F (29° C)
	Shock:	1,500 G/0.5-ms

NOTE:
For solid state disk drives, GB means 1 billion bytes. 16GB is the unformatted capacity of this drive before a portion of the drive is reserved for flash management features. Actual capacity varies by content and will be less than 15.8GB.

HP 160-GB Solid State Drive

Unformatted Capacity	160-GB	
Architecture	Multi Level Cell (MLC) NAND Flash with wear leveling 10 channel controller	
Interface	Serial ATA 2.0 (3.0 Gb/s)	
Dimensions (W x H x D)	2.74 x 0.37 x 4 in/6.98 x 0.95 x 10.2 cm	
Weight	0.18 lb/80 g	
Bandwidth Performance	**Sustained Sequential Read:**	Up to 250 MB/s
	Sustained Sequential Write:	Up to 70 MB/s
	Random Read:	Up to 35K IOPs
	Random Write:	Up to 6.6K IOPs
Latency	**Read:**	65-ms
	Write:	85-ms
Power	**DC power requirement:**	5 VDC 5%-100 mV ripple p-p
	Total power consumption:	0.15W (active); 0.075W (idle)
Useful Drive Life	35TB written, up to 20GB/day for 5 years	

Technical Specifications – Solid State Data Storage

Environmental (all conditions, non-condensing)	**Operating Temperature:**	32° to 158° F (0° to 70° C)
	Relative Humidity:	5% to 95%
	Maximum Wet Bulb Temperature (operating):	84° F (29° C)
	Shock:	1,500 G/0.5-ms

NOTE:

For solid state disk drives, GB means 1 billion bytes. 16GB is the unformatted capacity of this drive before a portion of the drive is reserved for flash management features. Actual capacity varies by content and will be less than 15.8GB.

HP USB Standard Keyboard

Physical characteristics	**Keys**	104, 105, 106, 107, 109 layout (depending upon country)
	Dimensions (L x W x H)	18.0 x 6.4 x 0.98 in (45.8 x 16.3 x 2.5 cm)
	Weight	2 lb (0.9 kg)
Electrical	**Operating voltage**	+ 5VDC ± 5%
	Power consumption	50-mA maximum (with three LEDs ON)
	System interface	USB Type A plug connector
	ESD	CE level 4, 15-kV air discharge
	EMI - RFI	Conforms to FCC rules for a Class B computing device
	Microsoft® PC 99 - 2001	Functionally compliant
Mechanical	**Languages**	38 available
	Keycaps	Low-profile design
	Switch actuation	55-g nominal peak force with tactile feedback
	Switch life	20 million keystrokes (using Hasco modified tester)
	Switch type	Contamination-resistant switch membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft (1.8 m)
	Microsoft PC 99 - 2001	Mechanically compliant
Environmental	**Acoustics**	43-dBA maximum sound pressure level
	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	-22° to 140° F (-30° to 60° C)
	Operating humidity	10% to 90% (non-condensing at ambient)
	Non-operating humidity	20% to 80% (non-condensing at ambient)
	Operating shock	40 g, six surfaces
	Non-operating shock	80 g, six surfaces
	Operating vibration	2-g peak acceleration
	Non-operating vibration	4-g peak acceleration
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
	Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence

Technical Specifications - Input/Output Devices

Approvals	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC	
Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	
Kit contents	Keyboard	Installation Guide
	Warranty Card	Safety and Comfort Guide

HP PS/2 Standard Keyboard

Physical Characteristics	**Keys**	104, 105, 106, 107, 109 layout (depending upon country)
	Dimensions (L x W x H)	18.0 x 6.4 x 0.98 in (45.8 x 16.3 x 2.5 cm)
	Weight	2 lb (0.9 kg) minimum
Electrical	**Operating voltage**	+ 5VDC ± 5%
	Power consumption	50-mA maximum (with three LEDs ON)
	System interface	PS/2 6-pin mini din connector
	ESD	CE level 4, 15-kV air discharge
	EMI - RFI	Conforms to FCC rules for a Class B computing device
	Microsoft PC 99 - 2001	Functionally compliant
Mechanical	**Languages**	38 available
	Keycaps	Low-profile design
	Switch actuation	55-g nominal peak force with tactile feedback
	Switch life	20 million keystrokes (using Hasco modified tester)
	Switch type	Contamination-resistant switch membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft 1.8 m
	Microsoft PC 99 - 2001	Mechanically compliant
	Acoustics	43-dBA maximum sound pressure level
	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	-22° to 140° F (-30° to 60° C)
	Operating humidity	10% to 90% (non-condensing at ambient)
	Non-operating humidity	20% to 80% (non-condensing at ambient)

Technical Specifications - Input/Output Devices

Environmental	**Operating shock**	40 g, six surfaces
	Non-operating shock	80 g, six surfaces
	Operating vibration	2-g peak acceleration
	Non-operating vibration	4-g peak acceleration
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
	Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence
Approvals	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC	
Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	

HP USB Smart Card (CCID) Keyboard

Introduction:

Boost your security, simplify access procedures and reduce the costs associated with managing networks by preventing unauthorized access to your computers and networks using smartcard technology with the HP Smart Card (CCID) Keyboard.

The USB Smart Card (CCID) Keyboard is a full-sized keyboard that takes advantage of digital signatures and certificates to secure the environment for transactions performed on both public and private networks. The USB Smart Card (CCID) Keyboard works with all smart cards that comply with ISO standard 7816.

Smart cards are easy-to-use credit card-sized devices which require multiple forms of information to be validated before you gain access to your accounts or resources. Used worldwide, smart cards strengthen access to a network or other resource using dual-factor authentication. Implementing a two-factor authentication (or multi-factor authentication) process reduces the risk of unauthorized access by verifying and validating your identity in one of the following ways:

- Something you know - a combination of username and password or PIN
- Something you have - a smart card or security token.

Something you have (smart card) plus something you know (PIN), improves user-access security within corporate network environments. Smart cards are used in government agencies, healthcare companies and the finance industry.

HP ProtectTools Smart Card Manager provides authentication software for the smart card. The Smart Card Reader module works with the HP ProtectTools Security Manager and enables the user to setup, use, and manage the smart card. This allows strengthened security with HP patented technology.

Key Benefits:	• Protects against unauthorized access with smart card technology • Delivers even greater security when combined with a HP ProtectTools smart card and the HP ProtectTools Security Software • Combination of username and password or pin with a smart card or security token • Secures online transactions using digital signatures and certificates • Conforms to industry standards for ease of setup and use • Delivers long product life and quiet operation with high-impact materials and lubricated keys • Spill drain feature	
	Keys	104, 105, 106, 107, 109 layout (depending upon country

Technical Specifications - Input/Output Devices

	Form factor	USB basic smart card keyboard
Physical Characteristics	**Colors**	Carbonite/Silver
	Dimensions (H x W x D)	18.2 x 6.3 x 1.3 in 46.3 x 16.1 x 3.3 cm
	Weight	2 lb (0.9 kg) minimum
	Operating voltage	+ 5VDC ± 5%
	Power consumption	100-mA maximum (with four LEDs ON)
Electrical	**System interface**	USB Type A plug connector
	ESD	CE level 4, 15-kV air discharge
	EMI - RFI	Conforms to FCC rules for a Class B computing device
	Microsoft PC 99 - 2001	Functionally compliant
	Languages	30+ available
	Keycaps	Standard design
	Switch actuation	55 g nominal peak force with tactile feedback
	Switch life	20 million keystrokes (using Hasco modified tester)
Mechanical	**Switch type**	Contamination-resistant membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft (1.8 m)
	Microsoft PC 99 - 2001	Mechanically compliant
	Acoustics	43-dBA maximum sound pressure level
	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	-22° to 140° F (-30° to 60° C)
	Operating humidity	10% to 90% (non-condensing at ambient)
	Non-operating humidity	20% to 80% (non-condensing at ambient)
	Operating shock	40 g, six surfaces
Environmental	**Non-operating shock**	80 g, six surfaces
	Operating vibration	2-g peak acceleration
	Non-operating vibration	4-g peak acceleration
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
	Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence
	Support	All ISO 7816 smart cards
	Interface	Reads from and writes to all ISO7816-1, 2, 3, 4 memory and microprocessor smart cards (T=0, T=1)
	Chipset	SCM STCIII
	Standard APIs supported	PC/SC, EMV2000, CT-API

Technical Specifications - Input/Output Devices

SmartCard Function	**Power**	USB Port	
		Short circuit detection (protects smart card and reader)	
		Power supply compliant with ISO7816 and EMV (5V, 60 mA)	
		Supports 3-V and 5-V cards	
	Power consumption	100-mA maximum draw	
	Communication	From card	9600 bps to 330,000 bps
		From computer	12 Mbps (USB transfer speed)
	Landing mechanism	Contact device	Friction contact
		Card insertions rating	Up to 100,000 insertion cycles
	Interface modes	CCID protocol	
	Reader performance interface	USB connection	
	Electro-magnetic standards	Europe	2004/108/EC
		USA	USAFCC part 15
Approvals	CE-Mark, UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC, EMV2000, USB-IF		
Ergonomic Compliance	ISO 9241-4, TUVGS		
Kit Contents	Keyboard, I/O Security and Documentation CD, warranty card		

HP USB & PS2 Washable Keyboard

Physical Characteristics	**Keys**	104, 105, 106, 107, 109 layout (depending upon country)
	Dimensions (L x W x H)	18.0 x 6.4 x 0.98 in (45.8 x 16.3 x 2.5 cm)
	Weight	2 lb (0.9 kg) minimum
Electrical	**Operating voltage**	+ 5VDC ±5%
	Power consumption	50-mA maximum (with three LEDs ON)
	System interface	USB Type A plug connector
	ESD	CE level 4, 15-kV air discharge
	EMI - RFI	Conforms to FCC rules for a Class B computing device
	Microsoft® PC 99 - 2001	Functionally compliant
Mechanical	**Keycaps**	Stepped -profile design
	Switch actuation	55-g nominal peak force with tactile feedback
	Switch life	20 million keystrokes
	Switch type	Contamination-resistant switch membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	7 ft 2.2 m

Technical Specifications - Input/Output Devices

	Microsoft PC 99 - 2001	Mechanically compliant
	Acoustics	43-dBA maximum sound pressure level
	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	-4° to 149° F (-20° to 65° C)
	Operating humidity	10% to 95% (non-condensing at ambient)
	Non-operating humidity	0% to 95% (non-condensing at ambient)
Environmental	**Operating shock**	40 g, six surfaces
	Non-operating shock	80 g, six surfaces
	Operating vibration	2-g peak acceleration
	Non-operating vibration	4-g peak acceleration
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
	Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence
Approvals	UL, cUL, FCC, CE, TUV GS, VCCI, BSMI, C-Tick, KCC, USB-IF, WHQL, EN/IEC 60601-1, IP66/NEMA4X	
Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	

HP PS/2 Optical Mouse

Dimensions (H x L x W)	1.56 x 2.44 x 4.61 in (3.95 x 6.21 x 11.7 cm)	
Weight	4.44 oz (126 g)	
	Operating temperature	-32° to 104°F (0° to 40° C)
	Non-operating temperature	-4° to 140°F (-20° to 60° C)
	Operating humidity	10% to 90% (non condensing at ambient)
	Non-operating humidity	10% to 90% (non condensing at ambient)
Environmental	**Operating shock**	40 g, 6 surfaces
	Non-operating shock	80 g, 6 surfaces
	Operating vibration	2 g peak acceleration
	Non-operating vibration	4 g peak acceleration
	Drop (out of box)	80 cm height onto asphalt tile over concrete or equivalent, 5-drop in 5 direction except the cable face

Technical Specifications - Input/Output Devices

Electrical	**Operating voltage**	5 VDC ± 10%
	Power consumption	100mA
	System consumption	PS/2 mini-din connector
	ESD	CE level 4, 15 kV air discharge
	EMI-RFI	Conforms to FCC rules for a Class B computing device
	Microsoft PC99 - 2001	Functionally compliant
	Resolution	400 ± 20% DPI
	Tracking speed	10 in/s (25.4 cm/s) maximum
	Acceleration	100 in/s/s (2.54 m/s/s)
	Switch actuation	61 g nominal peak force
Mechanical	**Switch life**	3,000,000 operations (using Hasco modified tester)
	Switch type	Low force micro-switches
	Tracking mechanism life	155 mi (250 km) at average speed of 10 in/s
	Cable length	6 ft (1.8 m)
	Microsoft PC99 - 2001	Mechanically compliant
	Width	8 mm
	Diameter	1.01 in (25.6 mm)
Scroll wheel	**Maximum rotation speed**	48 rats/sec
	Switch type	Light force micro-switch
	Switch life	1 million operations
	Mechanical life	Minimum 200,000 revolutions
Regulatory Approvals	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC	

Technical Specifications - Input/Output Devices

HP USB Optical Mouse

Dimensions (H x L x W)	1.5 x 4.5 x 2.5 in (3.8 x 11.6 x 6.3 cm)
Weight	0.27 lb (0.12 kg)
Cable length	72.8 in (185 cm)
System requirements	Microsoft Windows 95, 98, 2000, Me, XP and Vista Available USB port

HP USB Laser Mouse

Scroll Wheel	24	
Maximum Rotation Speed	48 rats/sec	
Switch Type	Wheel	
Switch Life	Button - 3,000,000	
	Wheel - 1,000,000 times	
	Tilt switch - 500,000 times	
Environmental	**Operating Temperature**	32° to 104° F (0° to 40° C)
	Non-operating Temperature	-4° to 140° F (-20° to 60° C)
	Operating Humidity	10% to 90% (non-condensing at ambient)
	Non-operating Humidity	20% to 80% (non-condensing at ambient)
	Operating Shock	40 g, six surfaces
	Non-operating Shock	80 g, six surfaces
	Operating Vibration	2-g peak acceleration
	Non-operating Vibration	4-g peak acceleration
Electrical	**Operating Voltage**	+ 5VDC ± 5%
	Power Consumption	
	MTBF	> 150,000 hrs
	ESD	IEC-61000-4-2 criteria B, Contact discharge: +/- 4kV, Air discharge: +/- 8kV
	EMI-RFI	FCC Class B
	PC98	PC 99 Compliant

Technical Specifications - Input/Output Devices

Mechanical	**Resolution**	800dpi
	Tracking Speed	25 cm/sec
	Acceleration	0.5mm
	Switch Actuation	0.6N (60gf)
	Switch Life	Button - 3,000,000
		Wheel - 1,000,000 times
		Tilt switch - 500,000 times
	Cable Length	1850mm
	PC98-99	PC99 compliant
Regulatory Approvals	UL60950-1, UL 94, UL 746 (A-E), UL 796 TUV/GS: EN 60950-1, EN 60825-1 FCC Class B, UL 1950, cUL, TUV GS, CE, C-tick, VCCI, BSMI, RRL	

HP Blu-ray Writer Drive

AMO Part Number	AR482AA		
Height	5.25-inch, half-height, tray-load		
Orientation	Either horizontal or vertical		
Interface type	SATA		
Disc capacity	50 GB DL or 25 GB standard		
Dimensions (W x H x D)	5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 19.0 cm)		
Weight (max)	2.0 lb (907 g)		
	DVD-ROM	8.5GB DL or 4.7GB standard	
	Blu-ray	50GB DL or 25GB standard	
	Full Stroke DVD	< 250 ms (seek)	
	Full Stroke CD	< 210 ms (seek)	
	Blu-ray	< 275 ms (seek)	
		(Time to drive ready from tray loading)	
Disc Capacity		BD-ROM (SL/DL)	25S / 28S
		BD-R (SL/DL)	25S / 28S
		BD-RE (SL/DL)	25S / 28S
		DVD-ROM (SL/DL)	18S / 18S
	Startup Time	DVD-R (SL/DL)	25S / 25S
		DVD-RW	25S
		DVD+R (SL/DL)	25S / 25S
		DVD+RW	DVD+RW 25S
		DVD-RAM	45S
		CD-ROM	15S
	CD-ROM Read	CD-ROM up to 40X	
		CD-R up to 40X	
		CD-RW up to 40X	
	DVD-ROM Read	DVD-RAM up to 5X	
		DVD+RW up to 10X	

Technical Specifications - Removable Storage

Maximum Data Transfer Rates		DVD-RW up to 10X
		DVD+R DL up to 8X
		DVD-R DL up to 8X
		DVD-ROM up to 16X
		DVD-ROM DL up to 8X
		DVD+R up to 12X
		DVD-R up to 12X
	Blu-ray	BD-ROM up to 6X
		BD-ROM DL up to 4.8X
		BD-R up to 6X
		BD-R DL up to 4.8X
		BD-R up to 6X
		BD-RE SL/DL up to 4.8X
Power	**Source**	SATA DC power receptacle
	DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p 12 VDC ± 5%-200 mV ripple p-p
	DC Current	5 VDC -1000 mA typical, 1600 mA maximum 12 VDC -600 mA typical, 1400 mA maximum
Environmental (all conditions non-condensing)	**Temperature** (operating)	41° to 122° F (5° to 50° C)
	Relative Humidity (operating)	10% to 90%
	Maximum Wet Bulb Temperature (operating)	86° F (30° C)

HP SuperMulti DVD Writer Drive

AMO Part Number	AR630AT		
Height	5.25-inch, half-height, tray-load		
Orientation	Either horizontal or vertical		
Interface type	Serial ATA		
Dimensions (W x H x D)	5.9 x 1.7 x 8.0 in (15.0 x 4.4 x 20.3 cm)		
Weight (max)	2.6 lb (1.2 kg)		
	CD Media Read Access	Random	< 120 ms typical
		Full Stroke	< 200 ms typical
	DVD Media Read Access	Random	< 130 ms typical
		Full Stroke	< 240 ms typical

Technical Specifications - Removable Storage

		CD-ROM, CD-R Read	Up to 6000 KB/s (40X)
		CD-RW Read	Up to 4800 KB/s (32X)
		Digital/Analog Audio Playback	Up to 2400 KB/s (16X)
	CD Media Read Transfer	Digital Audio Extraction (CD-ROM, CD-R)	Up to 6000 KB/s (40X)
		Digital Audio Extraction (CD-RW)	Up to 4800 KB/s (32X)
		Video CD Playback	Up to 2400 KB/s (16X)
		DVD-ROM SL Read	Up to 21600 KB/s (16X)
		DVD-ROM DL Read	Up to 10800 KB/s (8X)
		DVD Video Playback	Up to 10800 KB/s (8X)
		DVD Video SL (other than playback)	Up to 21600 KB/s (16X)
	DVD Media Read Transfer	DVD Video DL (other than playback)	Up to 10800 KB/s (8X)
		DVD-R	Up to 21600 KB/s (16X)
		DVD+R	Up to 21600 KB/s (16X)
Performance		DVD-RW	Up to 10800 KB/s (8X)
		DVD-R DL	Up to 10800 KB/s (8X)
		DVD+RW	Up to 10800 KB/s (8X)
		CD-R Write	Up to 6000 KB/s (40X)
		CD-RW	600 KB/s (4X)
	CD Media Write Transfer	CD-RW (High speed)	1500 KB/s (10X)
		CD-RW (Ultra speed)	Up to 3600 KB/s (24X)
		CD-RW (Ultra speed+)	Up to 4800 KB/s (24X)
		DVD+R	Up to 21600 KB/s (16X)
		DVD+R DL (v1.2)	Up to 16200 KB/s (8X)
		DVD+R DL (v1.1)	Up to 10800 KB/s (8X)
		DVD+RW (Volume 2 v1.0)	Up to 10800 KB/s (8X)
		DVD+RW (Volume 1 v1.3)	Up to 5400 KB/s (4X)
		DVD-R (v2.1 rev. 6.0)	Up to 16200 KB/s (12X)
	DVD Media Write Transfer	DVD-R (v2.1 rev. 4.0)	Up to 21600 KB/s (16X)
		DVD-R DL (v3.0 rev. 5.0)	Up to 10800 KB/s (8X)
		DVD-R DL (v3.0 rev. 3.0)	Up to 10800 KB/s (8X)
		DVD-RW (v1.2 rev. 3.0)	8100 KB/s (6X)
		DVD-RW (v1.2 rev. 2.0)	Up to 5400 KB/s (4X)
		DVD-RAM (v2.2 rev. 5.0)	Up to 16200 KB/s (5X)
		DVD-RAM (v2.2 rev. 2.0)	Up to 6750 KB/s (5X)
	Media	**Read**	**Write**
	CD-ROM	Yes	No
	CD-R	Yes	Yes

Technical Specifications - Removable Storage

Media Compatibility	CD-RW	Yes	Yes
	DVD-ROM	Yes	No
	DVD-ROM DL	Yes	No
	DVD-RAM	Yes	Yes
	DVD+R	Yes	Yes
	DVD+R DL	Yes	Yes
	DVD+RW	Yes	Yes
	DVD-R	Yes	Yes
	DVD-RW	Yes	Yes
	DVD-R DL	Yes	No
Power Supply	Source	SATA DC power receptacle	
	DC Power Requirement	5 VDC ± 5%	100 mV ripple p-p
		12 VDC ± 5%	200 mV ripple p-p
	DC Current	5 VDC	<1000 mA (typical) 1600 mA (max.)
		12 VDC	1200 mA (typical) 2000 mA (max.)
		Total Drive Power (Standby Mode)	< 2.5W
Rear Panel	SATA Power Connector, 15-pin SATA Data Connector, 7-pin Markings to identify each connector		
Environmental conditions (all conditions non-condensing)	Temperature (operating)	41° to 122° F (5° to 50° C)	
	Temperature (storage)	–22° F to 140° F (–30° C to 60° C)	
	Relative Humidity	10% to 90%	
	Maximum Wet Bulb Temperature	86° F (30° C)	
	Altitude	0 to 10,171 ft. (0 to 3,100 meters)	

HP DVD-ROM Drive

AMO Part Number	AR629AA		
Height	5.25-inch, half-height, tray-load		
Orientation	Either horizontal or vertical		
Interface type	Serial ATA		
Dimensions (W x H x D)	5.8 x 1.7 x 6.9 in (14.8 x 4.2 x 17.5 cm)		
Weight (max)	2.1 lb (950 kg)		
	CD Media Read Access	Random	< 120 ms typical
		Full Stroke	< 200 ms typical

Technical Specifications - Removable Storage

Performance	DVD Media Read Access	Random	< 130 ms typical
		Full Stroke	< 240 ms typical
	CD Media Read Transfer	CD-ROM, CD-R Read	Up to 6000 KB/s (40X)
		CD-RW Read	Up to 4800 KB/s (32X)
		Digital/Analog Audio Playback	Up to 2400 KB/s (16X)
		Digital Audio Extraction (CD-ROM, CD-R)	Up to 6000 KB/s (40X)
		Digital Audio Extraction (CD-RW)	Up to 4800 KB/s (32X)
		Video CD Playback	Up to 2400 KB/s (16X)
	DVD Media Read Transfer	DVD-ROM SL Read	Up to 21600 KB/s (16X)
		DVD-ROM DL Read	Up to 10800 KB/s (8X)
		DVD Video Playback	Up to 10800 KB/s (8X)
		DVD Video SL (other than playback)	Up to 21600 KB/s (16X)
		DVD Video DL (other than playback)	Up to 10800 KB/s (8X)
		DVD-R	Up to 21600 KB/s (16X)
		DVD+R	Up to 21600 KB/s (16X)
		DVD-RW	Up to 10800 KB/s (8X)
		DVD-R DL	Up to 10800 KB/s (8X)
		DVD+RW	Up to 10800 KB/s (8X)

Media Compatibility	**Media**	**Read**	**Write**
	CD-ROM	Yes	No
	CD-R	Yes	No
	CD-RW	Yes	No
	DVD-ROM	Yes	No
	DVD-ROM DL	Yes	No
	DVD-RAM	Yes	No
	DVD+R	Yes	No
	DVD+R DL	Yes	No
	DVD+RW	Yes	No
	DVD-R	Yes	No
	DVD-RW	Yes	No
	DVD-R DL	Yes	No

Power Supply			
	Source	SATA DC power receptacle	
	DC Power Requirement	5 VDC ± 5%	100 mV ripple p-p
		12 VDC ± 5%	200 mV ripple p-p
		5 VDC	1000 mA (typical) 1600 mA (max.)

Technical Specifications - Removable Storage

	DC Current	12 VDC	1200 mA (typical) 2000 mA (max.)
		Total Drive Power (Standby Mode)	< 2.5W
Rear Panel	SATA Power Connector, 15-pin SATA Data Connector, 7-pin Markings to identify each connector		
Environmental conditions (all conditions non-condensing)	Temperature (operating)	41° to 122° F (5° to 50° C)	
	Temperature (storage)	–22° F to 140° F (–30° C to 60° C)	
	Relative Humidity	10% to 90%	
	Maximum Wet Bulb Temperature	86° F (30° C)	
	Altitude	0 to 10,171 ft. (0 to 3,100 meters)	

HP Slim SuperMulti DVD Writer Drive

AMO Part Number	VP034AA	
Height	12.7mm height	
Orientation	Either horizontal or vertical	
Interface type	SATA/ATAPI	
Disc recording capacity	Up to 8.5 GB DL or 4.7 GB standard	
Dimensions (W x H x D)	5.0 x 0.5 x 5.0 in (128 x 13.6 x 129 mm)	
Weight (max)	0.42 lb (190 g)	
Write speeds	**DVD-RAM**	Up to 5X
	DVD-R DL	Up to 4X
	DVD+R	Up to 8X
	DVD+RW	Up to 4X
	DVD+R DL	Up to 4X
	DVD-R	Up to 8X
	DVD-RW	Up to 6X
	CD-R	Up to 24X
	CD-RW	Up to 16X
	DVD-RAM	Up to 5X
	DVD-RW, DVD+RW	Up to 8X

Technical Specifications - Removable Storage

Read speeds	**DVD-R DL, DVD+R DL**	Up to 6X
	DVD+R, DVD-R	Up to 8X
	DVD-ROM DL, DVD-ROM	Up to 8X
	CD-ROM, CD-R	Up to 24X
	CD-RW	Up to 24X
Access time (typical reads, including settling)	**Random**	DVD: < 140 ms (typical), CD: < 125 ms (typical)
	Full Stroke	DVD: < 250 ms (seek), CD: < 210 ms (seek)
	Stop Time	< 4 seconds
	Cache Buffer	2 MB (minimum)
	Data Transfer Modes	ATA PIO mode 4 (16.7 MB/s); ATA Multi-word DMA mode 2 (16.7 MB/s); ATA UltraDMA Mode 3 (44.4 MB/s - default)
Power	**Source**	Four-pin, DC power receptacle
	DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p
		12 VDC ± 5%-200 mV ripple p-p
	DC Current	5 VDC (< 1000 mA typical, 1600 mA maximum)
		12 VDC (< 600 mA typical, 1400 mA maximum)
	Total Drive Power (standby mode)	< 2.5 Watt
Audio output	**Line-Out**	0.7 VRMS
	Signal-to-Noise Ratio	74 dB
	Channel Separation	65 dB
Environmental conditions (operating - non-condensing)	**Temperature**	41° to 122° F (5° to 50° C)
	Relative Humidity	10% to 90%
	Maximum Wet Bulb Temperature	86° F (30° C)

Technical Specifications - Removable Storage

HP Slim DVD-ROM Drive

AMO Part Number	VP033AA	
Height	12.7mm	
Orientation	Either horizontal or vertical	
Interface type	SATA/ATAPI	
Dimensions (W x H x D)	5.0 x 0.5 x 5.0 in (128 x 13.6 x 129 mm)	
Weight (max)	0.42 lb (190 g)	
Read speeds	**DVD+R/-R/+RW/ -RW/+R DL /-R DL**	Up to 4X
	DVD-ROM	Up to 8X
	CD-ROM, CD-R	Up to 24X
	CD-RW	Up to 24X
Access time (typical reads, including settling)	**Random DVD**	DVD: < 140 ms (typical), CD: < 125 ms (typical)
	Random CD	DVD: < 250 ms (seek), CD: < 210 ms (seek)
	Data Transfer Modes	ATA PIO mode 4 (16.7 MB/s); ATA Multi-word DMA mode 2 (16.7 MB/s)
Power	**Source**	Four-pin, DC power receptacle
	DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p
	DC Current	5 VDC - <1000 mA typical, < 1600 mA maximum
	Total Drive Power (standby mode)	< 2.5 Watt
Audio output	**Line-Out**	0.7 VRMS
	Signal-to-Noise Ratio	74 dB
	Channel Separation	65 dB
Environmental (all conditions non-condensing)	**Temperature**	41° to 122° F (5° to 50° C)
	Relative Humidity	5% to 85%
	Maximum Wet Bulb Temperature (operating)	86° F (30° C)

HP 22-n-1 Media Card Reader

Technical Specifications - Removable Storage

USB Interface	USB 2.0 High-speed interface **NOTE:** Requires the USB cable to be connected to the internal USB 2.0 port or a USB 2.0 PCI card.
Advance protocol support	Supports hardware ECC (Error Correction Code) function Supports hardware CRC (Cyclic Redundancy Check) function Supports MS 4-bit parallel transfer mode Supports MS-PRO 4-bit parallel transfer mode Supports MS PRO-HG Duo 4-bit parallel transfer mode Supports SD 4-bit parallel transfer mode Supports high-speed 50Mhz SD 4-bit card (version 2.0) Supports high-speed 52Mhz MMC 8-bit card (version 4.2) Supports CF v4.0 with PIO mode 6 and Ultra DMA mode
Supported media type	CompactFlash Type I CompactFlash Type II Microdrive MultiMediaCard (MMC) Reduced Size MultiMediaCard (RS MMC) MultiMediaCard 4.2 (MMC Plus, including MMC Plus HC) Reduced Size MultiMediaCard 4.2 (MMC Mobile, including MMC Mobile HC) Secure Digital Card (SD) Secure Digital High Capacity (SDHC) miniSD miniSD High Capacity Micro SD (T-Flash) Micro SD HC Memory Stick Memory Stick Select Memory Stick Duo (MS Duo) Memory Stick PRO (MS PRO) Memory Stick PRO Duo (MS PRO Duo) Memory Stick PRO-HG Duo

Technical Specifications - Removable Storage

Supported media type with card adapter	MagicGate Memory Stick (MG)
	MagicGate Memory Stick Duo
	xD-Picture Card
	Memory Stick Micro (M2)
	MMC Micro

Eco-Label Certifications & declarations

This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks:

- US ENERGY STAR ®
- IT ECO declaration
- EPEAT Gold where HP registers commercial desktop products. See http://www.epeat.net for registration status in your country

Ultra Slim Desktop

Energy Consumption (typically configured)	115 VAC	230 VAC	100 VAC
Normal Operation	18.95 W	20.01 W	18.66 W
Sleep (Energy Star low power mode)	2.09 W	2.182 W	2.099 W
Off	1.128 W	1.228 W	1.127 W

NOTE:

Energy efficiency data listed is for an ENERGY STAR® compliant product if offered within the model family . HP computers marked with the ENERGY STAR® Logo are compliant with the applicable U.S. Environmental Protection Agency (EPA) ENERGY STAR® specifications for computers. If a model family does not offer ENERGY STAR® compliant configurations, then energy efficiency data listed is for a typically configured model.

Heat Dissipation (typically configured)*	115 VAC	230 VAC	100 VAC
Normal Operation	65 BTU/hr	68 BTU/hr	64 BTU/hr
Sleep	7 BTU/hr	7 BTU/hr	7 BTU/hr
Off	4 BTU/hr	4 BTU/hr	4 BTU/hr

* Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.

Declared Noise Emissions
(in accordance with ISO 7779 and ISO 9296)

System Fan Off	Sound Power (LWAd, bels)	Sound Pressure (LpAm, decibels)
Idle	3.7	28
Fixed Disk (random writes)	3.9	28

Batteries

This battery(s) in this product comply with EU Directive 2006/66/EC

Batteries used in the product do not contain:

- Mercury greater the 5ppm by weight
- Cadmium greater than 10ppm by weight

Battery Size CR2032 (coin cell)

Battery Type Lithium

Additional Information

- This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2002/95/EC.
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive - 2002/96/EC.
- This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).
- This product is in compliance with the IEEE 1680 (EPEAT) standard at the Silver where HP registers commercial desktop products. See http://www.epeat.net for registration status in your country.
- Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.
- This product contains 0.04% post consumer recycled plastic (by wt.)
- This product is 93.7% recyclable when properly disposed of at end of life.

Packaging Materials

- External:
  - Corrugated 1966 g
- Internal:
  - Polyethylene low density Foam 154 g
- The corrugated packaging material contains at least 38.38% recycled content.
- The Polyethylene low density Foam packaging material contains at least 60.42% recycled content.

Small Form Factor

Energy Consumption	115 VAC	230 VAC	100 VAC
Normal Operation	31.07 W	31.42 W	31.31 W
Sleep (Energy Star low power mode)	2.14 W	2.37 W	2.11 W
Off	0.88 W	1.06 W	0.86 W

Heat Dissipation*	115 VAC	230 VAC	100 VAC
Normal Operation	106.25 BTU/hr	107.4 BTU/hr	107.08 BTU/hr
Sleep	7.3 BTU/hr	8.10 BTU/hr	7.2 BTU/hr
Off	3 BTU/hr	3.6 BTU/hr	2.9 BTU/hr

* Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.

Technical Specifications - Environmental Data

Declared Noise Emissions
(in accordance with ISO 7779 and ISO 9296)

System Fan Off	Sound Power (LWAd, bels)	Sound Pressure (LpAm, decibels)
Idle	3.74	27.5
Fixed Disk (random writes)	4.53	32.8

Batteries

This battery(s) in this product comply with EU Directive 2006/66/EC

Batteries used in the product do not contain:

- Mercury greater the 5ppm by weight
- Cadmium greater than 10ppm by weight

Battery Size

CR2032 (coin cell)

Battery Type

Lithium

Additional Information

- This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2002/95/EC.
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive - 2002/96/EC.
- This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).
- This product is in compliance with the IEEE 1680 (EPEAT) standard at the Gold level where HP registers commercial desktop products. See http://www.epeat.net for registration status in your country.
- Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and ISO1043.
- This product contains 0.04% post consumer recycled plastic (by wt.)
- This product is 93.7% recyclable when properly disposed of at end of life.

Packaging Materials

- External:
  - Corrugated 1966 g
- Internal:
  - Polyethylene low density Foam 154 g
- The corrugated packaging material contains at least 38.38% recycled content.
- The Polyethylene low density Foam packaging material contains at least 60.42% recycled content.

Technical Specifications - Environmental Data

Convertible Minitower

Energy Consumption (typically configured)	115 VAC	230 VAC	100 VAC
Normal Operation	31.4797 W	31.2721 W	31.5603 W
Sleep (Energy Star low power mode)	2.1754 W	2.3982 W	2.1609 W
Off	0.9116 W	1.1064 W	0.8938 W

NOTE:

Energy efficiency data listed is for an ENERGY STAR® compliant product if offered within the model family . HP computers marked with the ENERGY STAR® Logo are compliant with the applicable U.S. Environmental Protection Agency (EPA) ENERGY STAR® specifications for computers. If a model family does not offer ENERGY STAR® compliant configurations, then energy efficiency data listed is for a typically configured model.

Heat Dissipation (typically configured)*	115 VAC	230 VAC	100 VAC
Normal Operation	108 BTU/hr	107 BTU/hr	108 BTU/hr
Sleep	7 BTU/hr	8 BTU/hr	7 BTU/hr
Off	3 BTU/hr	4 BTU/hr	3 BTU/hr

* Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.

Declared Noise Emissions
(in accordance with ISO 7779 and ISO 9296)

System Fan Off	Sound Power (LWAd, bels)	Sound Pressure (LpAm, decibels)
Idle	3.8	21
Fixed Disk (random writes)	3.8	21

Batteries This battery(s) in this product comply with EU Directive 2006/66/EC

Batteries used in the product do not contain:

- Mercury greater the 5ppm by weight
- Cadmium greater than 10ppm by weight:

Battery Size CR2032 (coin cell)

Battery type Li-Ion

Additional Information

- This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive – 2002/95/EC.
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.
- This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).
- This product is in compliance with the IEEE 1680 (EPEAT) standard at the Gold where HP registers commercial desktop products. See http://www.epeat.net for registration status in your country.
- Plastics parts weighing over 25 grams used in the product are marked per ISO 11469 and

ISO1043.

- This product contains 0.05% post consumer recycled plastic (by wt.)
- This product is 95.1% recyclable when properly disposed of at end of life.

Packaging Materials

- External
  - Corrugated: 1900g
- Internal
  - Polyethylene low density foam: 230g
- The corrugated carton packaging material contains at least 53.5% recycled content.
- The Polyethylene low density foam packaging material is made from 60.42% recycled content.

All Models

RoHS Compliance

Hewlett-Packard is committed to compliance with all applicable environmental laws and regulations, including the European Union Restriction of Hazardous Substances (RoHS) Directive. HP's goal is to exceed compliance obligations by meeting the requirements of the RoHS Directive on a worldwide basis. By July 1, 2006, RoHS substances will be virtually eliminated (virtually = to levels below legal limits) for all HP electronic products subject to the RoHS Directive, except where it is widely recognized that there is no technically feasible alternative (as indicated by an exemption under the EU RoHS Directive).

Material Usage

This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at: http://www.hp.com/hpinfo/globalcitizenship/environment/supplychain/gen_specifications.html):

- Asbestos
- Certain Azo Colorants
- Certain Brominated Flame Retardants - may not be used as flame retardants in plastics
- Cadmium
- Chlorinated Hydrocarbons
- Chlorinated Paraffins
- Formaldehyde
- Halogenated Diphenyl Methanes
- Lead carbonates and sulfates
- Lead and Lead compounds
- Mercuric Oxide Batteries
- Nickel - finishes must not be used on the external surface designed to be frequently handled or carried by the user.
- Ozone Depleting Substances
- Polybrominated Biphenyls (PBBs)
- Polybrominated Biphenyl Ethers (PBBEs)
- Polybrominated Biphenyl Oxides (PBBOs)
- Polychlorinated Biphenyl (PCB)
- Polychlorinated Terphenyls (PCT)
- Polyvinyl Chloride (PVC) - except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.
- Radioactive Substances
- Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)

Technical Specifications - Environmental Data

Packaging	HP follows these guidelines to decrease the environmental impact of product packaging: • Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials. • Eliminate the use of ozone-depleting substances (ODS) in packaging materials. • Design packaging materials for ease of disassembly. • Maximize the use of post-consumer recycled content materials in packaging materials. • Use readily recyclable packaging materials such as paper and corrugated materials. • Reduce size and weight of packages to improve transportation fuel efficiency. • Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.
End-of-life Management and Recycling	Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: http://www.hp.com/go/reuse-recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner. The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: http://www.hp.com/go/recyclers. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment.
Hewlett-Packard Corporate Environmental Information	For more information about HP's commitment to the environment: Global Citizenship Report http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html Eco-label certifications http://www.hp.com/hpinfo/globalcitizenship/environment/productdesign/ecolabels.html ISO 14001 certificates: http://www.hp.com/hpinfo/globalcitizenship/environment/operations/envmanagement.html

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